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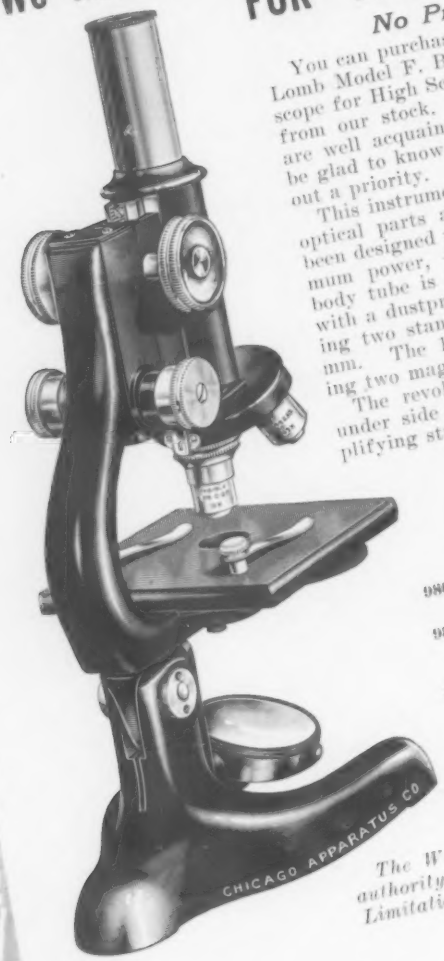

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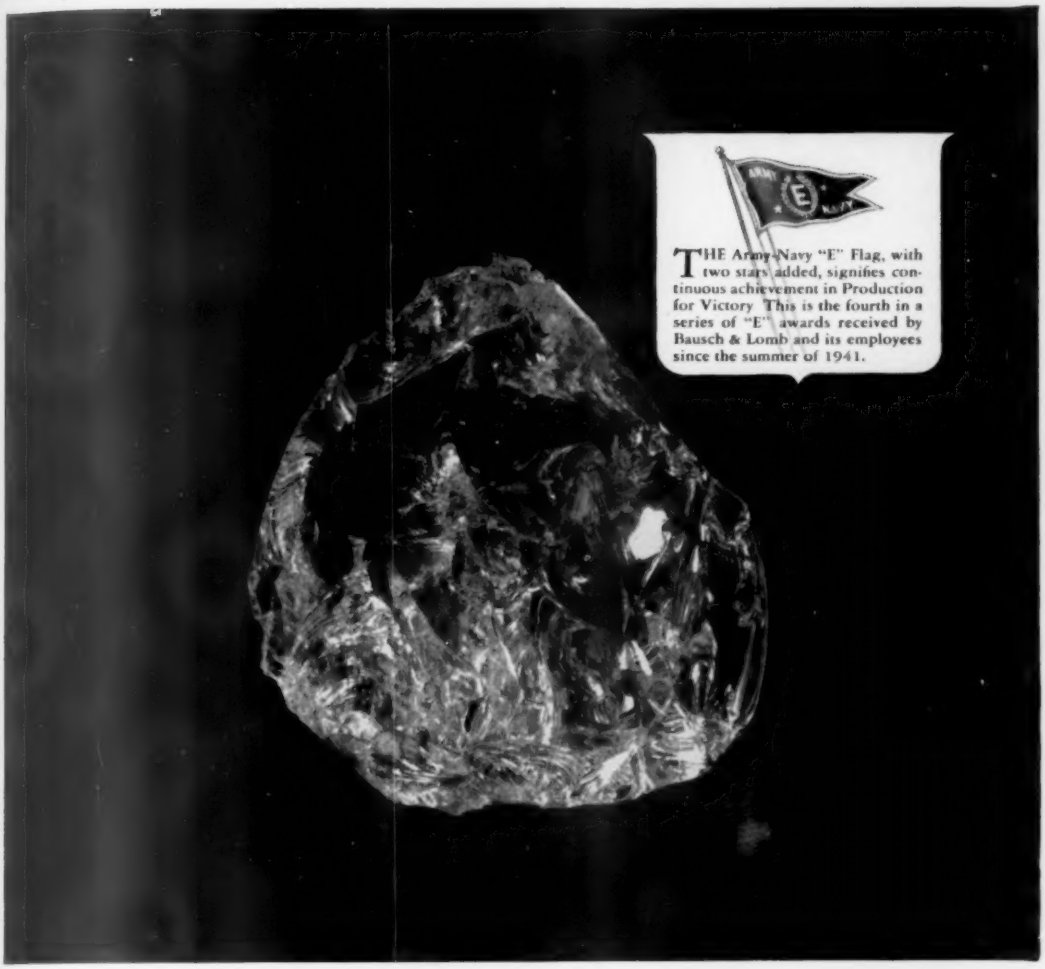
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The American Biology Teacher

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Scientific Aspects of the Race Problems*

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This paper is intended to present a brief review of valid scientific position on the following questions which are essential aspects of the race problem: (1) *What is race?* (2) *Are there superior races?* (2) *What are the effects of racial crossing?*

You probably have your own favorite scientific definition of *race*, but there is none more satisfying to most of us than that of Aleš Hrdlička. It is as painstaking and accurate as the research of the eminent physical anthropologist. He says that race is "a persistent strain, within any species, of broadly blood-connected individuals carrying steadily, *i.e.*, hereditarily, more or less well-defined physical characteristics which distinguish them fairly from all other strains and races. As a criteria of a *race* therefore may be stipulated an aggregate of plain, not shared, hereditary characters, of such nature as to distinctly set apart the strain carrying them from all others."[3]

Races, strains and species are mortal; they rise, they develop and they disappear. Correctly we visualize them as changing before our eyes. The Sumerians, the Babylonians and the old Egyptians are gone or are so thoroughly mixed with other strains that they have no true representatives today; the Tasmanians, the Australians and the African Bushmen are vanishing. In the New World we are watching the disappearance of the Fuegians. It is Edwin Embree who has pointed out that we here in the United States are observers of the development of a new strain which he calls *Brown American*.[4] During the long ages that have passed, races of which we know nothing, undoubtedly have lived and prospered before they perished.

* Presented before The Chicago Regional Meeting of The National Association of Biology Teachers, Oct. 31, 1942.

The monogenetic origin of the races of mankind has almost universal acceptance today. Doctor Carleton Stevens Coon of the Department of Anthropology at Harvard University gave delicious point to this dry fact in his book, *The Races of Europe*[2] by using a sketch of Neanderthal Man in modern dress. The artist took MacGregor's restoration of La Chapelle aux Saints, put a Fedora hat on the model's low brain case, and turned down the brim to partially cover the heavy supra-orbital ridges; he shaved the receding, but massive jaw and knotted a stylish tie under the soft collar of a modern shirt. And behold, the net result could pass us on State Street without causing us to glance at him a second time.

Racial characteristics, such as color of the skin, form of the hair shaft, cephalic and nasal indexes as well as prognathism vary greatly even within the racial group as we very well know. The darkest Caucasoids are much darker than the lightest Mongoloids or Negroids. Moreover, once we leave the safe anchorage of viewing all mankind as Caucasoid, Mongoloid or Negroid, and possibly Australoid, we meet all manner of difficulties. Traits appear and disappear within very small groups. This instability of physical characteristics complicates the problem of classification to such an extent that the physical anthropologist shrugs his shoulders at our troubled confusion and asks, "Surely you do not expect to find examples of pure race today?" In passing we might mention that Sir Arthur Keith has received measurably wide support for his thesis that the original stock from which modern races sprang was, very likely, brown pigmented; if this be true, both the very dark African and the very light European represent comparatively recent racial stocks.

The attempt to classify races by blood groups seemed at one time to offer rich possibilities; today the few scientists working in this particular field have returns that are almost negligible. The notion of different blood groups has a popular appeal still, however, and feeds prejudice to a remarkable degree. (Witness the controversy over accepting Negro blood donations for white service men.)

It would be easy to multiply evidence along the line of difficulty in racial classification, but perhaps it will suffice to quote the conclusion of Dr. Klineberg's competent study: "There is no homogeneity within each race, and no sharp line between race and race."[3]

We might remark at this point that the only people who know exactly what race is are not the scientists (who only know that they do not know) but rather the *racial politicians.*

Our second question: *Are there superior races?* brings with it other questions such as: *Are there racial differences as well as individual differences?* To this point we have been discussing the difficulties attendant on the differentiation of race from race and strain from strain, by the use of physical characteristics. The evidence points constantly toward the unity of mankind and emphasizes the transitory character of the surface differences that at first glance seem important. A popular fallacy concerns itself with racial odors. The only well-known scientific experiment in this field was that conducted by Lawrence who secured carefully labelled miniature tubes of perspiration collected from white and colored students who had been exercising violently in the gymnasium. There was no constant preference for the white samples when these tubes were submitted to the persons sharing in the

experiment.[6] There may be racial differences in body odors, but until the variables of diet and degree of cleanliness are held constant, no valid conclusion can be reached.

When we ask the question: *Are there racial differences in intelligence?* we are plunged into a torrent of subsidiary questions: *Are psychological traits inherited? Do the particular temperaments of father and mother determine the emotional characteristics of the child? Is the intelligence of the offspring a function of the germ cells from which they took origin? Is the volitional life of the child the result of the chance combination of inherited morality genes? If so to what degree?* These are some of the questions on which we must work before we can answer satisfactorily our second question: *Are there superior races?*

Concerning intelligence, probably Dr. Berger of Fordham expresses the consensus of opinion when he says: "In the case of intelligence heredity sets limits within which training and other forces determine the level attained. Of two individuals with the same degree of intelligence one may be the result of inferior mentality and excellent training, the other of superior heredity undeveloped by any formal education."[5]

To the question of racial differences in temperament we are safe in assuming that: "emotional traits are more directly referable to bodily structures than are other psychic characteristics . . . yet the bodily structures underlying the emotions are far more susceptible to modification by other bodily structures than for example, the brain."[5]

The attempt to study racial differences is further complicated by problems that arise in all group comparisons. Among these are *motivation* on the part of the tested and on those who administer the tests. For example, it was impossible to get valid scores from certain of the Dakota Indians because of the social mores of the group—they believed that it is bad form to answer a question in the presence of someone other than the questioner who does not know the answer.[6]

Cultural differences nullify the validity of certain tests. Dr. Underhill noted during her work with the Papago that they could not be hurried; their poise and deliberate calm broke when they were unduly stirred. Most of our tests put tremendous value on speed of reaction; in fact there are those of us who believe that what we actually measure is speed of reaction rather than native intelligence. Too, social and economic status are variables that stubbornly resist being held constant. Language difficulties are at times almost insurmountable. Witness the little English refugee who saw the sign *Flats fixed* hanging at an oil station. To him *flats* meant apartments, not flat tires, so he inquired anxiously why the notice concerning the apartments was hung beside a petrol pump, or in our parlance a gasoline pump.[7]

In the final analysis when we compare race with race or strain with strain we are looking at aggregate results based upon data secured in spite of these almost insurmountable difficulties which are multiplied as many times as there are individuals in the group compared. Dr. Lowie sums the matter up thus: "We may fairly say that for all racial stocks that have been adequately observed there is clear evidence of mental variability. . . . The suggestion that racial strains may differ in variability as to particular aptitudes, temperament, etc., cannot be brushed aside as worthless, but it should be treated for what it is—not a scientifi-

cally authenticated conclusion, but as a very humble initial hypothesis in a field in which literally nothing is known."[5]

Negro children in the Chicago area may be intellectually superior to white children; a newspaper account of a series of tests given a few years ago would seem to indicate such a condition, but the matter is far from proof, although some legislators, as Booker T. Washington remarked long ago, are convinced of the superiority of the intelligence of the Negro child because they expect him to learn as much as the white child in a much shorter school term, with very meagre school equipment and with teachers who are under-salaried and ill-trained.

Innate or ethnic differences in morality and in personality have not yet been demonstrated and there are those who feel confident that cross sections of one race would be likely to duplicate cross sections of another.

A great deal of pseudo-science has been propagated concerning racial crossing. No doubt you have had struggles with students who were firmly convinced that any racial crossing means a weakened strain; in other words, it is the popular belief that the offspring resulting from miscegenation has all the unfortunate characteristics of both races. C. B. Davenport collected considerable evidence in this field and accepting his findings as conclusive maintained that "a hybridized people are a badly put together people."[3] W. E. Castle's careful experimentation in breeding two species of rabbits led to an opposite conclusion, *i.e.*, that hybrids are intermediate and there is no disharmony in the offspring.[1]

A cautious, accurate expression of the matter is that of Dr. H. S. Jennings in his paper read at a symposium at the Catholic University of America two years ago and published with the other papers of the symposium in a volume which bears the title of the paper to which you are listening, *Scientific Aspects of the Race Problem*, published by Longmans Green: "The most general result of crossing diverse races is the production of many diverse combinations of the genes and characteristics of the races. Some of the combinations may not be harmonious; may be disadvantageous. They may manifest the combined poorer qualities of the races crossed. Others show the combined better qualities of the different races, giving rise to superior individuals. These things will occur with respect to both structural and physiological characteristics. Some of the hybrid descendants will be better physiological organisms than either parent race, some will be poorer. Many combinations of characteristics will occur that did not exist in the original races. In the long run there is selective elimination of the poorer, inefficient combinations, so that in time there emerges a new 'race' that is relatively homogeneous, combining characteristics from all the original races that entered the mixture. If the selective elimination is based on efficiency, the new 'race' that emerges may be superior to any that entered into it. In its general features, this process has been gone through many times in the past, and through it have arisen the races of the present day. None of these present-day races are homogeneous in genetic constitution."[5] Of one thing we may be sure: the popular fear that intermarriage between the various races and strains will tend to "mongrelize" the human race is unfounded.

In conclusion may I say that on being asked to speak to you I was at first in-

clined to refuse because I am classified as an ethnologist and sociologist rather than a biologist. On reflection it occurred to me that this might be an opportunity to stress certain facts that have grave import today. There has never been a time when it was more necessary to distrust our own emotions and impulses and quietly weigh the facts to get at the actual truth of the situation in which we find ourselves. The cool, objective findings of science invariably have a way of tempering our enthusiasms and lessening our prejudices. All scientists worthy of the name should be especially useful in time of war, not chiefly because of their positive contributions in the way of developing better instruments for the extinction of human lives, but especially by the quiet orderly fashion in which they meet new situations and share with their fellows the changing fortunes of the Home Front.

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3. DAVENPORT, C. B., and others. *Race crossing in Jamaica.* Pub. no. 395, Carnegie Institute. 516 pp. 1929. $7.

4. EMBREE, EDWIN. *Brown America.* Viking Press. 311 p. 1931. $2.50.

5. JENNINGS, H. S., and others. *Scientific Aspects of the Race Problem.* Catholic University of America. Longmans Green. 302 p. 1941. $3.

6. KLINEBERG, OTTO. *Race Differences.* Harper. 367 pp. 1935. $2.50.

7. PEDERSON-KRAG, GERALDINE. *Children in Exile.* Child Welfare League of America. 22 pp. Dec. 1940. 25c.

The Present Status of Sex Education in the United States

GEORGE W. HUNTER

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In 1920 a survey was made by the United States Health Service and the United States Bureau of Education on the status of sex education in the secondary schools of this country.[1] This was followed in 1927 by a second survey by the questionnaire method from which 745 responses were obtained from principals of the schools involved. A comparison of these responses was made in an interesting bulletin which appeared in 1928.[2] This publication gave a very complete picture (from the viewpoint of the principal) of the nearly 6,000 schools responding, as answers were received from every state in the Union. The finding showed clearly that certain parts of the country, notably the Southern states, lagged considerably in their interest in sex education as judged by the percentage of replies received and the kind of sex education presented. The findings also showed that during the interval between 1920 and 1927 there had been a considerable change in the type of sex education presented. While in 1920, 25.2% of the schools gave an "emergency" type of sex education, in 1927

[1] The Status of Sex Education in High School, *Education Bulletin* No. 5, Government Printing Office, Washington, D. C. 1921.

[2] Usilton, L. J. and Edson, N. W., Status of Senior High School Education in 1920, *V. D. Bulletin No. 87, Public Health Service,* Washington, D. C. 1928.

there were only 16.2% of the schools responding that gave this type of course. (By emergency sex education it was meant that the instruction is given in a special presentation, often by outside lecturers, and not as an integral part of the school program.) On the other hand in 1920, 15.5% of the schools responding gave an integrated course in which sex education appeared as an integral part of the subject matter, while in 1927 29% of the schools responding gave an integrated course. Of the schools responding 59.3% gave no sex education in 1920, while 29.1% gave none in 1927. Thus the picture showed a considerable advance during the eight years that elapsed between the two surveys.

The bulletin just quoted also showed that while there were several subjects with which sex education might be integrated, biology seemed to be the one outstanding subject which reported integration. About 30% of the schools reported sex education integrated with biology; 18% with social studies; 13% with hygiene; about 11% with physiology; 8% with psychology; about 5% with physical education; and less than 5% each with general science and home economics. The bulletin further showed that the lecture method with special lectures to large groups was rapidly giving way to the saner and more systematic instruction by the classroom instructor.

Those of us interested in the social hygiene movement have seen the gradual evolution of sex teaching from the type described in this bulletin and subsequent articles by Bigelow, Gruenberg, and others, to a much more social type of education. Gruenberg well describes its present status as a phase of character education.[3] And a similar point of view by Bigelow[4] appeared in the latest edition of his splendid contribution and by the writers of the still more recent Thayer report,[5] given us by the Progressive Education Association. As the latest revision of the Report on Health Problems[6] well puts it, "Sex education is a trend in the life study. It should lead directly to the preparation for marriage and parenthood." While there may be considerable difference in opinion as to the best vehicle of approach, thinking teachers are agreed that just as health education is a responsibility of the entire school, so sex education or social hygiene is also a responsibility, either directly or indirectly, of the departments of science, home economics, social science, English, and physical training. All departments of the school must work for the common end, and the work of these must be coordinated if the end is to be accomplished.

If we grant the statement above, we need to know more about the conditions as they actually exist in the secondary school. No surveys such as were made earlier have appeared, although a good many recent articles indicate that the trends mentioned above do exist. Dr. Bigelow[7] recently made a national survey in which he traveled 12,000 miles and visited most of the educational centers of the country. He states that he encoun-

[3] Gruenberg, B. C., and Konkonen, J. L., High Schools and Sex Education, *Educational Pamphlet No. 7*, United States Public Health Service. 1939.

[4] Bigelow, M. A., *Sex Education*, American Social Hygiene Association. 1936.

[5] Thayer, V. T., *Science in General Education*, D. Appleton Century Co. 1938.

[6] *Health Education*, Report of Joint Committee on Health Problems in Education of the National Education Association and the American Medical Association With the Cooperation of the Advisory Committees, National Education Association, Washington, D. C. 1941.

[7] Bigelow, M. A., Health Education in Relation to Venereal Disease Control Education, *Journal of Social Hygiene*. February, 1941.

tered "no important opposition to the larger social hygiene movement." He found a tendency (noted by the writer) to avoid the phrase "sex education" and "social hygiene education" and the substitution of other titles as "Family Life Education" and "Human Relations Education." All the educational leaders contacted agreed that sex education is important for the control of venereal disease in war time, and that the development of "sex-social" or "sex-character" education during the last twenty years has showed results. While Dr. Bigelow gives no statistics, he does report on some of the outstanding programs observed. Such are found in Minnesota, where excellent teacher training is being done; in Tulsa, Oklahoma, where an integrated program in the secondary schools has been under way for some time; in Oregon, where teacher training will soon show results in the secondary schools; in Tennessee, where funds are being devoted to the training of teachers *within* the schools; in California, where some schools are doing notable work in the preparation of parenthood; and in Texas, where excellent training is being done in the teacher training institution. Numerous recent articles in the *Journal of Social Hygiene*[8, 9, 10] show that individual "progressive" schools are doing excellent work in programs which stress character education and family education. But there seems to have been no attempt to carry on the survey of 1927.

The writer has therefore thought it worth while at this time to present some statistics obtained from two more recent questionnaires sent to teachers of science in all parts of the United States. The earlier of these, one of a series that dated back by ten-year intervals to 1910, were sent out to teachers of some 1500 representative Junior and Senior High Schools in 1930. Reports based on this questionnaire were published in 1931[11] and 1933.[12] While the questionnaire dealt with science sequence, placement, and enrollments in the secondary schools, it was quite comprehensive in scope and asked for information on the teaching of hygiene. In this section the following question was asked "To what extent are the problems of sex touched upon?" Fully ———— Slightly ———— Not at all ———— While this question was not covered in the papers quoted below, the answers were tabulated and were recorded graphically on page 397 of a text[13] written by the author from which the following figures are quoted by permission of the publisher. "In returns from 328 of the leading secondary schools of the United States, 68.15% of the senior high schools and 63.97% of the junior high schools do some work in sex education. 12.40% of the senior high and 5.15% of the junior high schools treat the subject fully, while 19.42% of the senior high schools and 30.88% of the junior high schools do no work in sex education." This would indicate a much higher percentage of

[8] Goldberg, T. A., Sex Character Education in Twenty-One Private Schools in New York City, *Journal of Social Hygiene*. November, 1941.

[9] The Schools Show Education in Family Life, *Journal of Social Hygiene*. November, 1941.

[10] Social Hygiene in War Time. The Program in Action, *Journal of Social Hygiene*. April, May, June, 1942.

[11] Hunter, George W., The Sequence of Science in the Junior and Senior High Schools of the United States, *Science Education*. December, 1931.

[12] Hunter, George W., Science Sequence in Junior and Senior High Schools, *School Science and Mathematics*. February, 1933.

[13] Hunter, George W., *Science Teaching at the Junior and Senior High School Level*, American Book Company. 1934.

schools giving sex education than was stated in the 1927 questionnaire. Incidentally, the respondents were teachers of science and probably knew more of actual conditions than the school principals in the 1927 questionnaire.

Ten years after the figures just given, returns from another questionnaire[14] answered by 655 schools in all parts of the United States gave the following picture. In response to the question, "Is sex education given as a separate course or included in other courses in the curriculum, and when is it given?", 36 schools reported giving some sex education in the seventh grade, 49 in the eighth grade, 98 in the ninth grade, 111 in the tenth grade, 57 in the eleventh grade, 67 at the twelfth grade, and 2 at the junior college level—a total of 422 offerings. Only 23 schools reported separate courses in sex education, while 322 schools stated that the information was offered as a part of other subjects, primarily general science and biology. Over 93% of the schools responding, therefore, gave integrated courses. Ninety-four schools say that considerable emphasis is given to the subject, 244 say that little emphasis is given, while 55 say the subject is avoided or no emphasis is placed on material pertaining to sex education. Here again an interesting comparison may be made with the 1927 questionnaire. Where in 1927, 55.1% of the schools replying gave no sex education, in the 1940 questionnaire of the writer a little less than 14% of the schools replying gave no sex education. This indicates a considerable gain in 13 years.

Interesting trends were noted. In the far West more attention was given to the subject, and there was a spread of sex education materials through the several years of the high school, indicating rather complete integration with other subject matter in the curriculum. In the North Central States the pattern was different, sex instruction there apparently coming with biology in the ninth or tenth year. Ohio evidently gives such information fused with the general science course in the seventh, eighth, and ninth years. No such definite pattern was found in the South, although Oklahoma and Texas are evidently fusing the material with general science and biology. The New England States apparently do little but New Jersey, New York, and Pennsylvania seem much interested in sex instruction, most of it being given in connection with general science and biology. Another interesting fact was that the Southern states, especially South Carolina, Florida, Tennessee, Oklahoma, and Texas, emphasize sex instruction, which presents quite a different picture from the findings of the 1927 questionnaire. While exact comparisons are not possible, it appears that 64.42 per cent of all schools answering the 1941 questionnaire give some instruction in sex education, and that about 93 per cent of such instruction is given as a fusion with other subject matter. Less than 7 per cent of the courses in sex education are separate courses.

The national survey[15,16] of secondary school biology, conducted by Riddle and his committee, included some questions concerning sex instruction. The report

[14] Hunter, George W., and Spore Leroy. Science Sequence and Enrollments in Secondary Schools in the United States. *Science Education.* December, 1941, February, 1942.

[15] Riddle, Oscar, and committee. *The Teaching of Biology in the Secondary Schools of the United States.*

[16] Riddle, Oscar. Amount and Nature of Biology Teaching in Secondary Schools. Data from a Questionnaire. *Am. Biol. Tchr.*, Vol. 4, p. 184. Mar., 1942.

says that "though teachers were asked to give data concerning the classes (subjects) in which 'sex education is a definite goal of instruction,' many of them drew a line through the word 'definite' and substituted 'incidental.' . . . Almost exactly one-third (958) of the 2,900 replies state that the topic is not taught. In New England and Southern states the topic is taught only slightly more often than it is omitted, while in Western states it is taught in approximately 75% of the schools. It is evident that the classes in general biology are most utilized for the teaching of sex education." This is in line with the practices as outlined by Gruenberg[17] in 1939. His report, which is one of the sanest written in recent years, redefines sex education as "a phase of character education," and emphasizes the fact that sex education must be developed "as an organic part of the entire educational program. It must not be considered a special and isolated bit of 'curriculum' to be 'taught' at a given time, and then discussed and finished." It is a part of life experience, and as such must be the business of all the departments of a school, just as health education should be.

[17] Gruenberg, B. C., and Konkonen, T. L. Op. cit.

The Radio in Biology

CHARLES L. HAGGARD
Community High School, Zeigler, Illinois

The writer spends several hours during the school year discussing with students, either privately or in small groups, the truth or falsity of certain radio announcements. This discussion is not altogether limited to the youth, for many adults are not able to judge wisely which advertisements are authentic. The public is invited to become acquainted with a given product by a 3-cent stamp, a box top, a penny post card or by whatever bait the concern happens to be using. Free samples, trial packages, explanatory literature and testimonials are usually sent to the would-be buyer.

Those who fall for this prittle-prattle are the ones who least need such advice, and if they are sick, least capable of diagnosing for themselves. As an example, those who are overweight can find a ready means of reducing by taking some highly advertised product. When nostrums are taken promiscuously and without the advice of one who knows, serious results may be encountered. If the obesity needs remedying let the patient consult a physician who can determine the cause and then prescribe accordingly. From the many factors causing obesity, one is hardly able to make his own diagnosis. He may need to eat less, to exercise more, to take some hormone or to follow any combination of instructions as outlined by his physician and should in no wise rely solely upon the persuasive power of some paid radio announcer.

Neither should one take medicine to gain weight without first determining the cause. Underweight may be caused by such an array of factors that only a skilled physician, after several weeks of case study, can determine the cause. One must know if the underweight is caused by lack of food, parasitism, malnutrition or some pathological condition.

Only careful diagnosis can determine the cause.

Highly advertised cereals, some of which have been refined to the point of minimum usefulness, are flooding the country via radio advertising. Children are told to eat such a brand if they expect to be like their radio hero. We are not denying they have food value, but we are forced to question all the virtues set forth. In some instances the highly refined foods have all but replaced the more staple foods of a generation ago. Today we cannot deny the existence, the value, and the necessity of vitamins, but it seems absurd indeed to remove the essential nutrients from our food and then take them separately in order to maintain good health. Surely nature understood the human requirements long before man discovered a scientific way to starve himself to death.

Vitamin capsules are advertised as an auxiliary nutrient in the diet. Script writers make the need so great for their use that the uninformed individual is between the Scylla of ignorance and the Charybdis of fear of poor health or even death. Such taking of vitamin capsules may prove harmful. It has been shown that large doses of vitamin D will cause death to small laboratory animals.* When such facts are withheld from the public, untold harm may be done. Let only those who have been thoroughly examined by a physician take the extra nutrients, and then upon his advice. Any brand of vitamins should not be taken by everyone who is permitted to buy them on the open market. Plenty of wholesome food usually eliminates the taking of extra nutrients.

Today, pastries, desserts, and beverages are played up to the nth degree, and along with these we are admonished to swallow tablets, pills, and capsules if we are to reach our three score and ten.

In addition to the advertising of vital foodstuffs, there are nostrums of various kinds held up before the public, some of which have little or no therapeutic value and others which are a decided hindrance to the cure of whatever ailment the sufferer has. Just as long as these products are allowed to be advertised over the radio, and as long as Mr. Citizen can buy them in the open market, just that long will the well-being of our nation be in jeopardy. The average American is not able to diagnose his own case nor to prescribe his own medicine.

Take the case of tooth paste advertising. Here one is confronted by several different brands, either paste or powder, none of which can fulfill all claims made for it. The irium of a certain tooth paste was a strong selling point until chemists analyzed its contents and made known its chemical structure. Since the irium was another name for the same material found in Dreft (a washing compound) little has been said about its virtues.

No tooth paste or powder can clean the teeth and oral cavity unless used regularly, and if one takes daily care of his teeth and gums, ordinary table salt has been found to give excellent results. Bicarbonate of soda also can be used, except in the latter case the soda reacts with the mucin of the mouth and forms a coating or film over the teeth. This film has a tendency to seal over particles of food and other matter unless the teeth are brushed vigorously before the soda is used.

Many times the question is asked if Bayer's Aspirin is any better than the ordinary brands. Most people are of the opinion that the more an article is adver-

* Bush, et. al., A Biology of Familiar Things. American Book Company. P. 47. 1939.

tised the more useful it is and the better it is for one. This, of course, is by no means true, hence the above question. Students are somewhat surprised to learn that the Bayer product is not materially different from other brands. Biology teachers should be able to give their students the correct information concerning many nostrums one finds in the average drug store. Someone has said where there is no vision the people perish and it may also be said where there is little information people may also perish.

Various effervescent salts are advertised for "morning-after feeling," "too much eating," "excessive drinking and smoking," "excess acidity," "tenseness of the day's work" and for the relief of minor aches and pains due to colds. The mere fact that these are mild alkaline substances is indication against their continued use. Neutralizing the acid of the stomach does not aid the digestive process, but slows it down until more acid is secreted or the food passes into the small intestine. The earnest coaxing by the announcer as he says "it contains an analgesic, sodium acetylsalicylate," should go unheeded. If translated, it might read thus: "it contains a pain reliever, acetanilide or a derivative of acetanilide, and has about the same value as aspirin."

The question naturally arises as to what one can do about this problem in his classes. There are some ways which can be used to aid the student in his biology course. One way is to have students listen to various forms of advertising and then explain to them the good and bad points. Most students are willing to receive instruction, in fact, many seek the advice of the teacher and expect an intelligent interpretation. In this manner one can cultivate good habits of reasoning and can guide the students in their choice of products. This of course, presupposes the teacher to have some knowledge of nostrums and the various advertised products, but after all the teacher is expected to lead the child in constructive thinking. Another way to create interest among students is to let them collect a few harmless leaves and concoct a so-called medicine of their own. Encourage them to write their own advertising claims. They may even put in the amount of the ingredients they used to stay within the limits of the "law."

Most schools either have, or can get, books and magazines relating to nostrums. *Skin Deep* by Phillips, *Nostrums* and *Quackery* by the American Medical Association, *Consumers' Research, 100,000,000 Guinea Pigs*, Government publications, and others can aid the biology teacher in this important work.

It is the writer's opinion that much and lasting good can be gotten from a study of the advertising claims given over our radios. Unless we teachers are willing to take up the responsibility of enlightening our communities, and getting wholesome information to the public, we might as well content ourselves with just "hearing" our classes in biology, and not expect to develop critical judgment and constructive thinking.

WE ARE QUOTED

Page 146 of the current (March, 1943) number of *Nature Magazine* is devoted almost entirely to a review of our *Conservation Issue*. There are quotations from the articles by Lumley, Sprecher and Eyestone, together with much favorable comment on the issue as a whole. The concluding statement is: "It is most encouraging to find the biology teachers getting behind conservation education. It augurs well for the future."

Editorial Comment

THE VICTORY GARDEN

The Victory Garden program for 1943 offers to biology teachers an opportunity to be of real and immediate service. Wherever it is at all possible, a garden should be included in the spring projects of the biology courses. Much of the work will carry over into the summer, offering added applications of what has been learned in class.

The need for this activity is not a matter of argument. About one fourth of our total food production has been set aside for our armed forces and for lend-lease shipments to our allies. Transportation systems are strained to the limit. So we shall have to raise more food ourselves and raise it nearer home.

The school garden idea is not new. It has been a more or less standard part of biology for a long time. However, it received a tremendous boost last year, and should be carried still farther in 1943. Many lessons were learned last year and there were mistakes that will not be repeated.

In many places the biology classes worked hand in hand with the Boy Scouts, Girl Scouts, 4–H Clubs and other interested organizations. In several localities biology and agriculture classes got together on the actual projects. In some cases the products of the gardens were processed by home economics and community nutrition classes and stored for use in school cafeterias. In this and many other ways a high degree of cooperation, both within schools and between schools and communities, grew out of the garden projects. Much more of this kind of activity can and should be achieved.

The biology teacher should look over his own community situation at once if he has not already done so. If a suitable organization already exists he should support it to the best of his ability. If not he should enlist all the enthusiasm of his pupils for immediate action.

Each teacher will have to select standard vegetables suited to the soil and climatic conditions of his own locality. Information can be obtained from state departments of agriculture, county farm agents, public libraries, state agricultural colleges, local civilian defense units, local and state garden clubs, farm magazines, seed houses and many other sources.

EASTER SEALS FOR CRIPPLED CHILDREN

The tenth annual sale of Easter seals for crippled children, sponsored by the *National Society for Crippled Children* and its affiliated organizations, will be conducted this year from March 26 to April 25.

In this year of war and national stress, the arrival of our envelope of Easter seals in the mail brings home a truth to us that applies not only to the societies for crippled children in America, but all other worthy enterprises carried on for the public welfare by volunteer groups of men and women.

In normal times, our money, our energy—a certain slice of our life, in short—is devoted to those activities which make democracy what it is and moulds a way of life that we believe worth fighting for.

But it is a paradox of war that while we are waging it, there is a tendency to put by those very things that we fight for. This is understandable; and in the case of a nation fighting for its very existence very likely necessary.

The growth of the annual Easter seal sale for crippled children, sponsored by the National Society for Crippled Children, reflects the public desire that this work continue and flourish.

For information, write The National Society for Crippled Children, Inc., Elyria, Ohio.

THE MORALE OF THE SCHOOL

"The morale of the school has always been the morale of action, of work for a specific purpose, of youth, eager and strong and daring, with all the world before it. To the schools of America the country turns now for the technical training of its boys and girls in essential wartime skills; for the toughening of their moral, mental, and physical fiber; and for the strengthening of their devotion to the cause of democracy. Many of these young people may go fresh from school to places which are nothing now but names on a war map, with the destiny of their country committed into their hands. Before all of them lies a world in ruins to be built again, in freedom and in mutual trust, when the war is over."

Reprinted from the November Health Bulletin for Teachers, published by the School Health Bureau of the Metropolitan Life Insurance Company, New York City.

CHICAGO BIOLOGY ROUND TABLE

The regular 1942–43 meetings of the CHICAGO BIOLOGY ROUND TABLE are being held at the Top of the Town Restaurant, 22nd Floor, 185 N. Wabash Avenue. The programs have been timely and exceedingly interesting and instructive.

On October 16th, Dr. Louis R. Krasnow of the Department of Physiology, Northwestern University, spoke on *The Relation of Biology to Aviation*. Dr. Krasno explained the fundamental physiological principles of aviation and stressed the importance of teaching these principles to our high school students. He pointed out that the limitations in aviation are not mechanical, but biological.

On December 11th, Dr. William S. Hoffman, Professor of Physiological Chemistry, Chicago Medical School, spoke on *Sulfa Drugs, Their Use in Medicine and Surgery*. Dr. Hoffman first gave an interesting account of the history of the Sulfa Drugs, and then called attention to their successful use in the treatment of certain diseases and wounds. He also cautioned against their promiscuous use because of the dangerous toxic reactions which may occur.

The Chicago Biology Round Table sponsored the Regional Meeting of the *National Association of Biology Teachers* held at the Morrison Hotel on October 31st. The subjects that were discussed are of special interest to Biology Teachers at this time. They were as follows:

Child Welfare Problems Created by the War Emergency, Miss T. M. Alanko, Illinois Division of Child Welfare

Scientific Aspects of the Race Problem, Sister Mary Henry, Rosary College, River Forest, Illinois

New Cell Developments, Dr. R. W. Gerard, Department of Physiology, University of Chicago.

At the Biology Section Meeting of the Central Association of Science and Mathematics Teachers on November 27th, the Chicago Biology Round Table was represented by two of its members, Miss Helen Trowbridge who spoke on *How to Strengthen the Teaching of High School Biology*, and Mrs. Goldia Howes on *Making Biology More Worthwhile for Girls*.

ESTHER A. OLSON
Corresponding Secretary

FILMS FOR AMERICA AT WAR

American education has been called upon to go all out for victory. *Films for America at War*, prepared under the guidance of the Committee on Motion Pictures in Education, supplies for the teacher, or leader of adult groups, essential information on 114 war-related films. It forms the first supplement to *Selected Educational Motion Pictures: A Descriptive Encyclopedia*.

The films included in this supplement are limited to those which deal with domestic phases of the war effort. They may be divided into three general groups: (1) general interest films dealing with war production and civilian participation in the war effort, (2) films on health, nutrition, and first aid, and (3) training films.

Film librarians, students and instructors of audio-visual education courses in eighteen colleges and universities cooperated during the summer of 1942 in the preparation of content material and appraisals. Wherever possible classroom evaluations of films were secured. The full title, appropriate audience levels, running time, primary source, release date, and rental sources introduce the material on each film. This information is followed immediately by the appraisal of the film and the judgment of technical quality. A complete objective description of content completes the information on each film.

Films for America at War is available from the American Council on Education, 744 Jackson Place, Washington, D. C. It sells for $1.00.

THE DISPLAY CASE AS A TEACHING DEVICE

Science pupils given an opportunity to plan and arrange interesting and educational displays in the windowed cases in the corridors of the high school building have gained invaluable experience and knowledge. Hand-made explanatory cards are printed for each exhibit. Guided by the teacher when necessary the pupil-volunteers enjoy the brief time allotted to them for their displays.

Casein plastics and fabrics were collected and reports were made which led to a "Processed Grass" display. The miniature milk maid and cow placed in front of a pint of milk and a jar of casein centered the observers attention. Buckles, buttons, combs, pen-holders, fabrics, paint, etc., made of casein were displayed. Pupils made rhymes on the explanatory cards. Two are printed here.

From suspenders to a flashlight
From forks to a new golf tee
In colors that change all through the
Night and blend in harmony.
These are made of plastics.
An invention fairly new.
They'll be making ships out of it
Before the fad is through.

Bill Hill, '41

Plastics, buckles and buttons have come our way
To make all of our clothes very snappy and gay.

Edith Fechtman, '41

Flower and vegetable arrangements (following rules from *The National Council of Garden Clubs, Inc.*) have been placed on display with proper explanation. The knowledge gained by pupils has enabled them to place arrangements in the State Fair Show, at home and for special occasions. The vegetables were donated (with canned fruit juices) to the U.S.O., in keeping with the war effort.

Botanists arranged a "V" garden window. A small red wheelbarrow with flower and vegetable seed packets formed a central colorful "V." PLANT VEGETABLES IF YOU KNOW HOW and PLANT ORNAMENTALS TO UPHOLD MORALE printed on large boards completed the background for the fruit and vegetable figures brought by members of the classes. The corridor was crowded with grinning observers, causing a traffic jam between classes, when the citrus fruit gardener, cucumber pig, carrot elephants, cabbage ladies, and peanut owls on branches of pussy willow were arranged. Using the same background after the perishables had been removed there were placed small experiments on methods of hastening growth by use of gases, vitamins, and hormones.

A "Victory Harvest" display is shown in the photograph. The life-sized scarecrow balanced by cornstalks formed the background for the colorful mound of

produce from pupil's gardens. Zinnia arrangements and canned food flank the mound of vegetables. The paper "V"s on the outside of the glass case bear the names of the student gardeners.

The "Camouflage in Nature" display based on articles in magazines which show how nature points the way to camouflage in wartime was planned. Persons stood counting the insects on grasses, stumps and branches until the last day for this display. Finally the

specimens were numbered (excepting certain species which could not be found in their well camouflaged habitat).

Plans are under way for an "Insects were First Fliers," using insects and model planes. Also, one on Conservation, using E. L. Palmer's cartoon idea, is planned. Habitat windows have proven successful.

Using the display case as a teaching device may aid some teacher. Many ideas have been brought to me by THE AMERICAN BIOLOGY TEACHER.

MILDRED F. CAMPBELL,
Shortridge High School,
Indianapolis, Indiana

ESCORTS FOR OPPOSITES

Even a pint of sea water can stir up creative thoughts and open up new horizons that go beyond what Columbus himself hoped to find by charting the unknown ocean. Mother Nature seems to take delight in creating materials of widely divergent properties and then uniting them so intimately that they appear as one inseparable whole. For centuries man thought of water as a simple substance and not a combination of explosive hydrogen and life-giving oxygen. Witness the union of unstable sodium and poisonous chlorine and the magical properties of the resulting salt.

Salt water magical? To prove it to your students just get a double socket, connected in series (it is easy to change a parallel one) and in one opening put a good bulb and in the other the skeleton of an old one, as illustrated in the cut. Of course the lamp will not light because the circuit is broken. Then continue the demonstration by turning off the current, contacting the skeleton wires and again pushing the button. Light! Then with the electrodes apart put them into the solution. Here is where the salt comes into the limelight, or rather turns on the light.

Since this experiment is being used to illustrate a biological problem, the nature of electricity need not be studied in detail. It is enough to point out that the electrodes act like the two ends of a horseshoe magnet and so have the power of attraction. The "escortability" of the salt solution provides the means whereby the negative charges migrate to the positive pole.

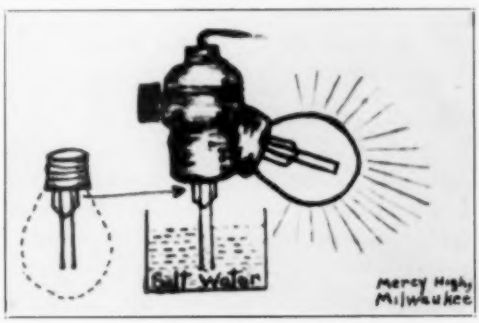
At this point students' questions exhaust the instructor's knowledge. They practically demand an answer to "What is electricity?" Give them just enough to make their curiosity itchy and guide the results.

The enthusiasm is catching. "I'm going to make my own set and try everything."

"Me, too, and show it to Dad. He loves to tinker with things. Wonder if sugar would work?"

A word of caution about how to handle electricity so that the students will have a healthy fear of it may not be out of order.

Students who learn about the conductivity of sodium chloride in this way take a deep interest in physiological salt solutions and their importance to the body. The study of blood and plasma follows as a "natural," and the nation will have gained a band of crusaders, too



young to give their own blood, but eager to broadcast the S.O.S. for older volunteers, who will make it possible for brave soldiers to live after the wounds of battle.

The blood itself escorts opposites; it carries lifeless food to the most distant cell and the inanimate substance becomes so one with the cell that, lo and behold, it is part of the cell and vibrant with life! This mighty red stream picks up the waste material and drops it off at the eliminating stations. It carries the oxygen that helps burn up the food, thereby releasing energy that makes the body physically fit. Such a body can enjoy not only the blessings of our American way of life but can also help to hold those God-given gifts.

Girls who are planning to be nurses, and boys who will want to know how to help in an emergency can be taught how necessary it is to be able to make up solutions of definite percentage. Sterilization procedures, under adverse circumstances, can also be emphasized. This ties up with bacteriology and so the story grows. Members of the *Victory Corps* will find in projects like this many outlets for the "rarin' to go" spirit in the service of their country.

Escorts for opposites are numerous, and it is profitable and enjoyable to make their acquaintance.

Sister Rosemary McManus, R.S.M.,
Mercy High School,
Milwaukee, Wisconsin

CHICAGO MEETING

Plans are well under way for a meeting of *The Representative Assembly*, at Chicago, at the College Club, 30 North Michigan Avenue, April 24, beginning at 9:30 A.M., to take action on the recently proposed amendments and to transact other association business.

SECONDARY SCHOOL SCIENCE AND MATHEMATICS IN RELATION TO THE MANPOWER PROBLEM—A COMMITTEE REPORT*

The purpose of this report of The Cooperative Committee on Science Teaching is to help secondary-school science teachers and administrators to analyze their part of the manpower problem and to plan ways of meeting their new and important task as rapidly as possible. The pre-induction courses outlined by the War Department are given major consideration in this report, but non-physical science courses (mathematics, biology, chemistry) are also reviewed in their relation to pre-induction training, to the broader manpower problem, and to wartime pressures and demands on the secondary schools.

The report notes five major needs for the work of young people. 1. The armed forces need men immediately with a practical technical training. 2. The armed forces need a continuous supply of scientifically trained workers. 3. Industry needs workers immediately with practical technical training. 4. Industry and civil life need a continuous supply of scientifically trained workers. 5. Business and agriculture need the services of boys and girls.

New courses are not proposed in chemistry or biology. But modifications and new areas of emphasis are suggested as

* The Cooperative Committee on Science Teaching has prepared a detailed statement on this subject, published in the February issue of *School Science and Mathematics*. Reprints of this article can be obtained free by writing to Dr. Robert J. Havighurst, chairman, The University of Chicago.

means of making these sciences more useful in meeting manpower needs. Believing that at this time the statement may be useful to biology teachers and to school administrators the section of the report dealing with Biology is being sent to THE AMERICAN BIOLOGY TEACHER. Though Dr. W. F. Loehwing, State University of Iowa, and the present abstractor are the representatives of biology on the Committee all sections of the report have received the attention and approval of the entire membership of the Cooperative Committee.

BIOLOGY

Apart from changes in subject matter incident to the war and postwar reconstruction, biology—when well taught—contributes much that is vital to national and personal welfare. Courses in biology contribute to a rational view of life and living things; provide a background for comprehension of nutrition and personal hygiene; contribute the basic elements of agriculture and animal husbandry; constitute the prescribed prerequisite as well as the stimulus for entry into medicine, public health, teaching, research, and agriculture. In either peace or war these vital products and by-products should be strengthened despite necessary shifts in emphasis in particular aspects of biology. A continuous supply of recruits to medical and health services seems even more essential in war than in peace, and it is highly desirable that a supply of professional biologists be trained for teaching and for a variety of technical services. The foregoing considerations provide the background for an appraisal of the value of high-school biology in wartime, and they have a bearing on questions concerning the content of biology-courses.

Since pre-induction training involves some new high-school subjects, it follows that, in general, trainees may have to drop one or another high-school subject. In any event, though some outright curtailment of the ordinary curriculum may become imperative, the immediate wartime importance as well as the peacetime values of biology appear definitely to justify its retention.

The content of biology courses, however, perhaps should be altered in terms of war effort. The following statements suggest points for emphasis even though, for certain schools, this may not involve a shift of emphasis.

(1) The student should become acquainted with the not-too-elementary facts concerning the structure, functions, and care of the human body. To every boy or girl this is useful in itself; it is essential to an understanding of nutrition; for prospective airmen it is a bit of basic knowledge; for soldier, factory worker, or agriculturist alike it affords some personal protection.

(2) The place of bacteria and fungi in personal hygiene, public health, water supply, and sewage disposal.

(3) The use of plant products in the production of food, clothing, shelter, medicine, plastics, and fermentology.

(4) Genetics, and plant and animal breeding. Objectives and results achieved in disease resistance, hybrid corn, etc., with particular reference to increased production per acre and lowered costs of production per unit of plant material; conservation of soil, forests, and grasslands in relation to wild life and flood control; new agricultural practices such as the planting of wood lots, close planting of certain forage crops, such as soy beans, as methods of weed control on farm lands.

(5) More attention to field work and applied ecology. In this work there is need for careful planning of objectives

and for testing to determine the achievements.[1]

Biological training has proven of value in the war effort in certain important and, to some extent, unforeseen ways. These applications can employ the skills of both high-school youth and the experts. The participation of school children in food production in local victory-garden projects will become increasingly important in the war. Closely related to this type of garden work by high-school students is the production of drug plants, the supply of which from foreign countries has been cut off. Scarcities of hyoscyamus and digitalis exist, and production of these plants is very similar to ordinary gardening. Matters of personal hygiene and first aid have also assumed importance in forestalling casualties which may result from neglect.

In addition to the foregoing activities to which students can contribute effectively, there are a number of uses for biology specialists in the war effort. Five handbooks of poisonous and edible plants are now being prepared for use of military personnel in each of the geographic areas of operations. Processing of natural camouflage for retention of foliage and color by means of certain so-called hormone sprays has enlisted the services of biologists. Other important uses of plant hormones involve the production of seedless fruits and the rooting of cuttings. The latter has recently been of great significance to the war in the propagation of cuttings from pine trees which produce exceptional quantities of turpentine; the cuttings can be rooted only by means of these rooting chemicals. Serious problems of food spoilage—of perishable produce in transit and storage—have developed needs for biologists with an understanding of such materials and the usual destructive microorganisms. Need for skilled biologists in this area has increased commensurately with expansion in transport and the number of men in the zones of military operations. The technological use of fermentive bacteria and molds in production of alcohol and ethylene glycol from agricultural products, for use in explosives, synthetic rubber and plastics, calls for an increasing number of experts trained in a combination of biology and chemistry.

In the field of genetics one of the most important scientific and practical developments has been the production, by means of colchicine and other drugs, of true-breeding hybrid crop plants in which the normal chromosome number has been doubled. Many of the resulting true-breeding polyploids are already in production because of their superior commercial value and vigor. Future advances in this field will be of increasing importance in agriculture. Other uses of biology in agriculture involve the production of American oil and fiber plants to replace foreign materials no longer available. Hemp, flax, or soy bean each yields a supply of oil, fiber, and seed meal in a single crop. Milk-

[1] The subject of teacher-training is not negligible here. The above list of topics for wartime emphasis well illustrates the importance of *broad* biological training for the teacher of high-school biology. Adequate training in subject matter on the college campus must now be sought from courses offered in four or five separate departments. Even then the especially desirable training in field work and applied ecology can rarely be obtained. To fill this need for inservice teachers special summer courses should be arranged and pursued, both at certain universities and at Lake and Marine laboratories. Groups of suitably trained biologists should participate in giving such courses, and large groups of teachers should attend them.

weed floss has proven a superior substitute for kapok and cork as an insulation material and for buoyancy in life preservers and aviators clothing. Milkweed floss is resistant to mildew, vermin, and to water because of its unwettable character and waxy coating. Perfection of liquid fertilizers for rapid results in increasing crop production and output per acre are important not only for the war effort but in permanent agriculture. These are but a few illustrations of new uses of biological subject matter which are essential in war.

Oscar Riddle (for the Committee),
Carnegie Institution,
Cold Spring Harbor, New York

A LETTER FROM AUSTRALIA

Dear Mr. Houdek:

Enclosed find check for next year's membership. The decimal system will be a pleasant change after working with pounds, shillings and pence over here. Found the article on war chemicals especially interesting since it's a subject close to us.

Been seeing some strange flora and fauna here. . . . They have an overgrown kingfisher here . . . when it isn't making a racket the ravens and magpies are. . . . Ibis, parrots, cockatoos, emus and lyrebirds are also found. . . . One soldier caught a five-foot lizard with about three-inch claws, another had a possum, still others had a parrot, koala and wallaby. The koala is said to have scratched its captor.

They have some fine museums here. Also several good nature magazines are published. Read a good article about "Splash," a pet platypus. These monotremes are quite rare here though. I've seen only a stuffed one. I've seen wombats, dingos (the "wild dog"), poisonous snakes, and many kinds of ants. The last named are quite numerous and some make large dwellings. These may be ten- or twelve-foot circular mounds, four- or five-foot columnar clay houses with three-foot circular bases, or eighteen-inch spheres of clay nestled in the notches of trees about fifteen feet up. . . . The country swarms with rabbits. The natives use ferrets to get them. We caught some by running them down and/or digging them out. That's probably why they call Aussie soldiers diggers. . . .

Please give my regards to Dr. Colin when you see him. Also please check my address.

Sincerely yours,
Morrison Budner.

BY THE WAY

Now Is The Time to get your classes interested in building and repairing bird houses. Don't paint them up brightly—leave them looking weathered and "natural."

The Early Migrating Birds are already with us. Bird calendars and all kinds of bird records should be started this month.

Don't Neglect The School Garden this year. It needs only some concerted effort to make it one of the most popular and profitable of biology projects. It is an excellent device for getting community cooperation in school affairs. This type of work has values that parents and patrons of the school can readily see.

Frog Eggs are already ready for collection in the more southerly parts of the country. Bring a few into the laboratory or classroom and watch their development. Keep them in a fairly large volume of water, in good light but not in direct sunlight for any length of time. At first the young tadpoles feed on the "jelly" in which the eggs are encased; when they begin to swim about they need to be fed green algae such as Spirogyra or other similar types. In the northern states eggs may be collected throughout April and May.

Books

Dahlberg, Gunnar. *Race, Reason and Rubbish, A Primer of Race Biology.* Columbia University Press, New York. 240 pp. illus. 1942. $2.25.

The first half of this little book consists of a brief discussion of the principles of heredity, illustrated by cases from plants and animals. The second half is an elementary treatment of some of the statistical consequences of Mendelian heredity in the human species, concluding with an essay on race. It is written for the general reader and is not designed as a text. There are no chapter headings or subheads, no problems, and no index.

In the opinion of the reviewer the first part would have been much strengthened by an elimination of some of the topics having no direct bearing on racial problems in man, such as asexual reproduction, gynandromorphism, intersexuality in Lymantria, polyploidy, and translocations, and an extension

of the discussion of principles that are directly applicable to human beings.

In the second part the author emphasizes the necessity of a careful biometrical analysis of a human population before eugenic applications are attempted. He points out the incompleteness of our knowledge of racial differences in man, and draws the general conclusion (with which most persons who are willing to look scientifically at the question will agree) that racial differences in mental characteristics have not been clearly demonstrated, and that in view of the enormous variability in mental traits within each racial group we ought to judge people as individuals rather than as representatives of a group.

Several errors have been noted: for example, on pages 120, 121, and 206 the word "pupil" is used in connection with eye-color, when "iris" obviously is meant; on pages 142 and 144 there are errors in numerical calculations. The type is clear and legible but some of the half-tones are not well reproduced.

The book is interestingly written. It contains the sort of sound information and conservative opinion that should have wide circulation in a modern world.

EDWARD C. COLIN,
Chicago Teachers College,
Chicago, Illinois

WATERS, EUGENE A. *A Study of the Application of An Educational Theory to Science Instruction*, Teachers College Contribution to Education, No. 864. 1942. Bureau of Publications, Teachers College, Columbia University.

This book is an effort to present specific techniques to assist teachers of science to apply newer educational theories, namely: (1) What should govern the selection of knowledge and subject matter in a course? (2) Should pupils' choices and judgments play a part in the selection of the contents of a course? (3) Should all pupils be required to cover the same ground? Forty-five tenth-grade pupils, in two sections, in General Science, were tried out for 22 weeks on the bases that: (1) pupils should select such problems as seem worthy of their efforts and interests, (2) classroom procedures should be built around pupils' concepts of their own experiences, (3) there should be no fixed amount of ground to be covered, (4) the value of methods of procedure should be stressed rather than subject matter.

The groups chose, by majority vote, to study electricity at first. By the end of the 8th week their subject matter spread from the construction of burglar alarms to electric door chimes. At the end of 22 weeks their subject matter had spread from sulphides of metals, physiology of plant growth, human reproduction to cosmetics and milk testing.

The experiment was well done and well reported. The book is stimulating and convincing in general, but open to argument in places. It should be read by every teacher of General Science.

GUY F. WILLIAMS

HUNTER, GEORGE. *Life Science.* American Book Company, New York. 803 pp. 1941. $1.56.

Mechanical Make-up: This book is a large one, $7 \times 9\frac{1}{4}$ by $1\frac{3}{8}$ inches, bound in rust-colored cloth, the front cover made interesting by a simple illustration of the southern flight of wild geese over a corn field at sunset. The paper is of good quality and the print clear. Illustrations are photos and line drawings of exceptional quality and include some half tones on hydroponics and plant nutrition. There are several modern multi-colored illustrations.

One disadvantage of this book is its size, which is incompatible with a health book for better posture, since the average child assumes a load of books to carry and a bad posture simultaneously.

A feature which will recommend itself to our "funnies"-minded young will be the clever and apropos cartoons scattered throughout the textual material.

Literary Style: Many interesting stories, expanding the understanding of the subject are found in this text. Some examples are the pollination of the Yucca, discovery of the Ancon breed of sheep, the navel orange, the fossil camels, and the accidental discovery of the parathyroid's action. These flashes of detail vitalize the necessary factual statements in a biology course and will secure interest and retention on the part of the student.

For the most part the book is comprehensible to the age level for which it is intended. The style is clear with the sentences moving along evenly. The vocabulary is generally suited to high school students, though such words as "involucre" and certain of the words used in the terminology of heredity might perhaps have been omitted.

Paragraph headings such as "How The Eyes Do Their Work," "What To Do About Deafness," and "Why The Patent Medicine Industry Has Flourished," speak to the student in a way that he will respond.

Subject Matter: At no time in world history have we felt a greater need for thinking citizens, for wise parents, for competent wage earners, and for a recognition of what good health contributes in the attainment of each of these. This author devotes some thirty-six

pages, under the title, "Biology And Life Activities," in the very first part of the text, to acquainting the student with "four general ways in which Biology may help anyone to become adjusted to his or her life problems."

Following the "parade" of the plants and animals we find twelve units. Each unit begins with the everyday experiences of the learner, then, through a series of worthwhile problems leads him from the practices of everyday living through many types of activities especially suited for individual differences, to a final test of his "ability to do reflective thinking."

On page 362 we see a dragonfly visiting a flower, as the student reads the ensuing pages he sees how a balance in nature is established, how the give and take policy is advocated, and how "life in a household or in a community implies mutual helpfulness," also how the peaceful happy balance in life depends upon cooperation even among nations. Lastly the student finds a ready-made list of "good references" to delve into.

Not only is this plan used in developing each unit, but the same scheme is used in unifying the text, *i.e.*, beginning with the individual, how he gets his living, and how each species is continued, from there he takes up the environment, the social life, conservation from soil to human life, and finally we have the key to human progress.

Psychological Soundness: Psychologically, this text seems to be geared to the interests of the scientific world now, and therefore, especially suitable to place in the hands of the budding scientists of the present day. It is real *Biology*, in that it stresses the continuity and interrelationship of all life and the importance of those concepts in man's physical, mental, and social life. The factual material is excellent and up-to-date and well and simply presented, with a wealth of practical applications and problems. There are so many questions which call for reflective thinking and the use of the scientific methods of thought. There is adequate provision for pupils of widely varying capacities and interests. Appended to each unit are excellent supplementary reading lists, listing references of varying difficulty.

Outstanding in this excellent text is that considerable attention is paid to citizenship training and vocational and avocational possibilities opening to the student of Biology. And we find also material on consumer education.

Learning Exercises And Teacher Helps: Laboratory exercises and demonstrations are indicated by title only in the text. They are, however, given in full in the activity workbook which accompanies the text. There are more exercises and demonstrations suggested than the average class could complete in a year. A separate activity workbook accompanies the text.

A preview, or introduction, to each unit is followed by several problems. At the end of each problem is found a self-test and a list of new terms. In addition, there are numerous problems or discussion questions, and suggested activities of various kinds, as well as suggestions for demonstrations, laboratory exercises, field trips, and projects.

At the end of each unit is found a self-test on fundamental concepts found in the unit, and a test of the ability to do reflective thinking, and a list of good references. The suggestions, test, references, etc., at the end of each problem and unit are outstanding features of this text. A glossary of thirteen pages, double column, is included. The author has admirably achieved a functional approach in this text.

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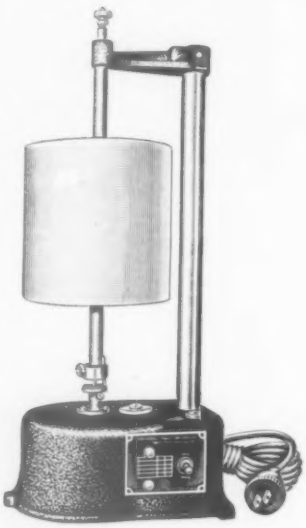

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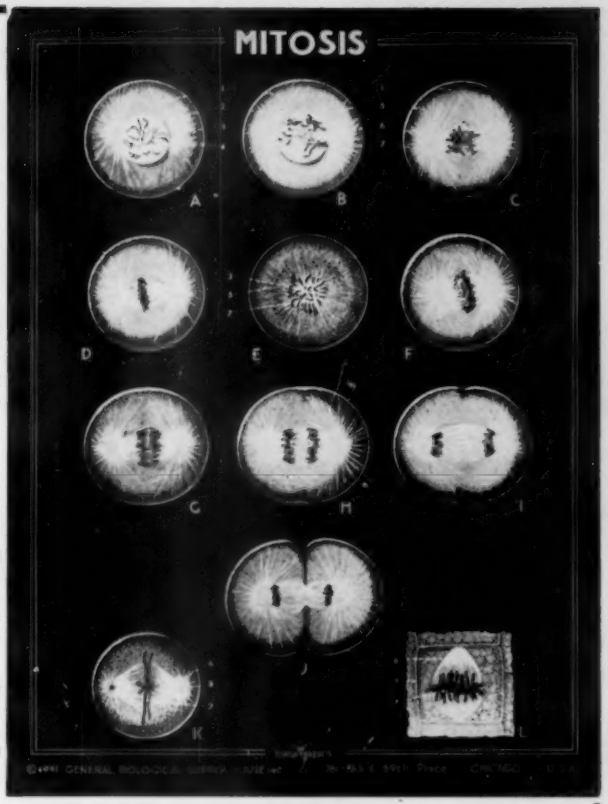

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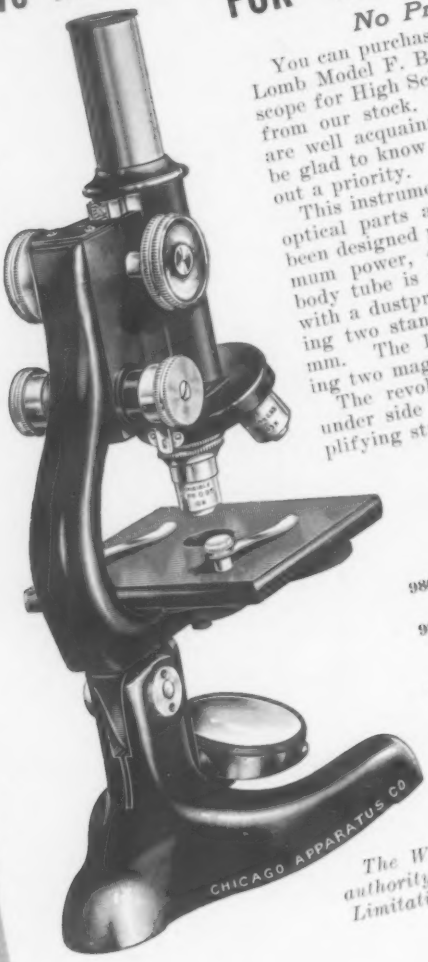

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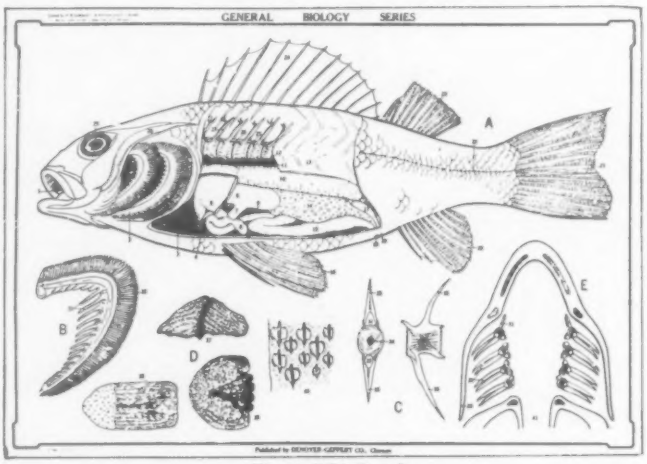

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Biology As A Career

PHILIP R. WHITE*
Rockefeller Institute for Medical Research, Princeton, New Jersey

Biology as a field of study has, I think, two great advantages over all other sciences as a medium through which to train young students for useful and reasonably happy lives. First of all, the subject matter of biology, life, is not a remote, abstract property of materials extraneous to ourselves. Respiration and digestion, pain, exhaustion or elation, growth and evolution are all things which we experience as individuals or see in our intimate comrades. For this reason the beginning student, if he has a bit of imagination and a good teacher, can interpret his biological studies in terms which gain reality in his mind by their personal application, and are therefore easy to grasp and hold. Biology has also a second great advantage in its adaptability to the experimental approach, which lends itself so well to training in the imaginative planning, rigorous observation, accurate recording and careful, dispassionate interpretation which are the essence of "the scientific method." Mathematics lends itself to imaginative planning, rigorous recording and interpretation, but not to experiment or observation. Geology lends itself to observation, recording and interpretation but not to planning and experiment. Pure physics and chemistry lend themselves to all of these but tend to be remote and cold unless brought into personal terms in which they become biophysics and bio-chemistry, hence biology. But experimental biology, especially physiology, possesses all these qualities in high degree. And botany especially, because of its wealth of material, and the easy availability, cheapness and general flexibility of that material, makes an ideal form of biological study.

Biologists themselves fall into three main categories. First there are those who, because of wide vision as well as deep knowledge, quick imagination and persistent curiosity, push out into new fields, discover problems, and lay the general plans for their solution. These qualities are rare. And they are born, not made. Training and experience may perhaps enhance them but can neither

* Winner of 1937 A. A. A. S. Award.

make nor destroy them. No school did and no school ever could turn out a Henry Ford or a Hugo de Vries, a Thomas Edison or a Luther Burbank. Nor could any school have made them less than they were. There are a few openings for such men, but fewer yet are the men to fill them.

Second, there come the organizers, those who, given an aim and a broad plan of attack, can fill in the details, bring together the knowledge necessary to properly orient investigation with a minimum of lost motion, delegate different tasks to those best fitted to carry them through and generally steer a successful course in uncharted or only poorly charted fields. These require certain native gifts, but they also require intensive training in the particular field of investigation concerned and in pertinent contiguous fields. Our secondary schools can quite properly begin building the foundations for work of this sort, by training the minds of those of its best students who show interests in the direction of biological investigation. Such training would involve sound foundations in both factual and methodological aspects not only of biological subjects but also of the essential collateral subjects, mathematics, physics and chemistry. Nor should thorough training toward mastery of the English language and of other languages be neglected, since scientific knowledge and the results of scientific investigation are valueless unless they can be fluently and lucidly shared with others through the medium of the spoken and written word. All too few scientists possess in adequate degree this faculty.

And third, there are the technical workers who, given a general aim and a detailed and highly developed plan, can, because of their mastery of particular techniques, carry out the actual manipulations of an investigation without necessarily understanding its aims and implications. These skills can rarely be imparted at the secondary school level, but the student can be given an idea of their existence and requirements, can be exposed to them to such an extent as to permit him to choose for future study those for which he has some aptitude or inclination.

Openings do exist in all of these categories. To outline them requires a nice discrimination between the Scylla of an over-rosy presentation and the Charybdis of discouragement. In our research institutions, such as *The Rockefeller Institute for Medical Research*, *The Boyce Thompson Institute for Plant Research*, *The Mellon Institute for Industrial Research*, *The Scripps Institute of Oceanography*, the various branches of the *Carnegie Institution*, the specialized research institutes attached to our hospitals and universities, the research and testing departments of our great pharmaceutical, chemical and food processing houses, such as Parke-Davis, du Pont, General Foods, etc., and in our Government experiment stations, both state and national, there are many openings for men with technical skills, as helpers, for routine procedures. These are often drawn from the secondary school level, although they will in most cases require further specialized training on the spot. There are also many, though fewer, openings for men of research calibre or for highly skilled specialists who must, with rare exceptions have both the training and the outlook and abilities represented by at least four and usually more years of college. Dieticians, Roentgenologists, hospital technicians are a few of the better known. Sometimes such openings crop up at most unexpected

places. I was once myself interviewed for a position with the Crown Cork and Seal Co., who had a serious problem in preserving bottle corks against the inroads of microorganisms. Few would think of looking for biologists in electroplating plants, telephone cable works, storage battery plants and plumbing establishments, but when molds grow in copper sulfate baths causing bubbles to appear in the plating, or attack the insulation of cables or when iron bacteria cause the sudden disintegration of supposedly rust-proof pipe, the biologist is called in post haste!

If I were to outline the things that our secondary schools *can* do in training and orienting students for careers in biological fields and particularly biological research, I would say, first, give them a broad acquaintance with *all* fields of scientific knowledge, botany, zoology, geology, astronomy, physics, chemistry, mathematics, psychology, "natural philosophy"; in other words, a sound, balanced, inclusive course in General Science, given without bias toward any one science and given with imagination and verve. Second, give them sound training in scientific methods of thinking such as can be imparted by a really thorough course in any of the particular sciences but which *must* include some "original" investigation, experiment and its interpretation, even though this may be on a very simple scale. And third, sound training in the humanistic background against which all man's activities must be laid if they are to be carried out with real understanding and satisfaction. If our schools can provide these, those students who are fitted to become biologists can be trusted to find the proper paths that lead to a career.

Opportunities for Biologists in the Field of Medicine and Public Health

ASA C. CHANDLER
Rice Institute, Houston, Texas

Biology is the hub from which radiate numerous lines of specialization and endeavor. It is the basis for the great productive industries of agriculture, forestry, animal husbandry, and fisheries, on which we depend mainly for our food, clothing, paper, and lumber. But perhaps even more important, it is the basis for all those professions that contribute to our health and general welfare—the cure and alleviation of disease, proper nutrition, conservation of health, and prevention of disease of man and his domestic animals.

Among the professions involved are human and veterinary medicine, dentistry, pharmacy, nursing, laboratory technique, bacteriology, parasitology, dietetics, and medical research.

Medicine, with all its subdivisions, is nothing more than a branch of biology. Biology is the science of life, medicine of disease control, and disease is only life out of balance. To have an adequate understanding of one branch of a science one must first have a comprehensive view of the whole. This is particularly true of medicine, for a knowledge of normal

life processes is a necessary prerequisite to an understanding of disrupted or maladjusted ones.

The first essential in the successful study of any science is the development of a genuine interest in it. If this interest can be developed early by a good biology course in the high schools, not only would progress in the colleges be more rapid, but many students would discover an interest in time to avoid being handicapped by starting out in other fields, and later having to change their curriculum.

The opportunities for professional work in fields related to medicine, nursing and public health have never been greater. The war has brought into sharp focus a shortage that has existed for a long time, but which previously had not been generally recognized. At present not only the Army and Navy, but also the Public Health Service, is desperately trying to find an adequate number of well-trained physicians, dentists, nurses, technicians, dietitions, bacteriologists, and medical entomologists, and is feverishly training them because they are not otherwise available. The need will not die with the end of the war, for there will be room for many more well-trained individuals in all these fields than we have ever had before. In dentistry, for example, we have had about one dentist for 1800 people, with the ratio actually decreasing in recent years. Yet dental defects are deplorably prevalent; they are the cause of one in five of Army rejections. Many more dentists will be needed to provide the service which an awakened public interest will demand after the war.

Particularly in the new and rapidly expanding field of preventive medicine and public health is the need for more trained men felt. In the past medicine has been largely concerned with the treatment and alleviation of disease, and we now have well-standardized courses for the training of physicians, dentists, veterinarians, pharmacists, medical technicians, and nurses. With preventive medicine it is different. This phase of medicine has developed so recently that it is still seldom permitted to stand on its own feet, but is forced to occupy a relatively minor position in the curriculum of medical schools.

Yet preventive medicine is already playing a very large part in our lives. Already we are taking the control of malaria, yellow fever, dengue, typhus, plague, dysentery, typhoid, undulant fever, smallpox, diphtheria, rabies, and many other diseases for granted, and it is only when there are disrupting circumstances, as in war, that we realize our dependence on them. It was dysentery, not the Turks, that defeated the British at Gallipoli, and it was dystentery and malaria, not the Japs, that defeated our own troops at Bataan.

In the future preventive medicine will become more and more important, and we will need many trained biologists to take care of it. I predict that we shall soon have special schools for the training of such men without first requiring the usual medical degree, just as we now have special schools of dentistry and pharmacy. These schools will provide thorough training in such subjects as bacteriology, parasitology, medical entomology, rodent control, immunology, and sanitary engineering. In the past we have recruited our public health men either from medicine or sanitary engineering, and neither has known enough about the other's work to enable them to work in harmony.

Human medicine, veterinary medicine and dentistry under normal conditions,

to which we will undoubtedly return after the present emergency, require a minimum of two years of academic college work and preferably three or four, followed by four years in a professional school. Pharmacists are given a four-year college course. The ideal nursing course consists of two years of regular college work followed by three years of training. Two schools, Yale and Western Reserve, give the three-year training to college graduates, and have never come near supplying the demand for the nurses they turn out. There are also more positions than can be filled for well-trained specialists in bacteriology, medical entomology and parasitology. For promising students in all of these fields there are many financial aids available in the form of scholarships, fellowships and loans.

As laboratory diagnosis becomes more and more highly developed the demand for well-trained technicians is increasing. We may soon hope for as strict control in this field as in that of medicine, nursing or pharmacy, with all technicians registered and licensed. It is an encouraging sign that something like 75% of our technicians are already registered. A minimum of two years of college work is required of them, followed by a year of training in an approved laboratory. The majority of registered technicians, however, like physicians and dentists, obtain a college degree before starting their professional training. For students who are interested in the medical aspects of biology but who wish to get into productive work early, this presents a fine opportunity.

Another rapidly expanding field is that of dietetics and nutrition. The need for improving our nutrition has been known for years, but examination of recruits for the army and navy has focussed attention on it, and the urgent effort to improve national nutrition for the sake of the general health, efficiency and morale of the country in the present crisis is making the entire population aware of the need. Dietitians are becoming more and more in demand by industries, schools, hospitals and clubs, by food manufacturing concerns, by advertising agencies, and by state and federal health services.

Interest in all of these fields connected with human health and welfare, and the foundations for them, should be provided early by a well-rounded biology course in high school. All of the professions I have mentioned are very satisfying ones for biologists. They provide opportunity for highly useful work, pleasant associations, and the challenge of uncharted fields ahead for the inquiring mind and pioneering spirit.

CHICAGO MEETING

As announced in the March issue, the *Representative Assembly* will meet in Chicago, Illinois, April 24, beginning at 9:30 A.M. The entire meeting will be held at the College Club, 30 North Michigan Avenue. President Russell has submitted the following summary of the purposes of this gathering, which from the standpoint of association business, takes the place of the regular December convention:

A. To consider amendments: 1. Giving the Executive Board power to "adjust the amount of membership dues as necessary to cover the cost of the Journal and the operation of the Association." 2. Empowering the Representative Assembly to retain officers during an emergency for a period of time designated by the Assembly. (See January and February Journals for the full text of the amendments.)

B. To consider the appointment of committees: 1. To study ways and means of studying Conservation, as suggested by Mr. Collins in the January Journal. 2. To study and make recommendations regarding a common name classification of plants and animals, as suggested by Professor Victor A. Greulach in the February Journal.

C. To consider ways and means of bringing to the attention of the Military Authorities the value of training in biology and how trained biologists may aid in winning the war.

D. To consider other suggestions which bear on the welfare of biology or other natural-science teachers.

Occupational Opportunities in Agriculture

CHESTER S. HUTCHISON
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Young men and women of high school or early college age must face the important problem of choosing a career, vocation or profession. A large percentage of high school graduates are confronted with this important problem. A wise choice may determine the difference between a happy, successful and profitable life or a life of discontent, regrets and failure. The choice of a lifetime career should be based upon the results of a thorough investigation of the requirements and opportunities of the various professions and vocations. The choice should be considered not from the standpoint of financial remuneration but more specifically from the viewpoint of opportunities for service to the community, state and nation.

Responsibility of Teacher

The teachers in the public and private schools of the nation must accept the responsibility of occupational or vocational guidance as a part of their program. Experience in college counseling reveals a large number of students who were inadequately counseled in high school. Many young people with a lack of knowledge of vocational occupations are entering colleges. Such students have been permitted to guide themselves in high school and are subsequently handicapped when they graduate from high school. Successful guidance is the process of assisting the individual in such matters as will contribute to the individual's normal growth and development. High school students should be able to go to their teachers for guidance in educational, personal, social, occupational or vocational problems. A teacher who refuses to accept this responsibility is shirking his or her duty.

Agriculture Needs Trained Men

The many phases of agriculture present large and varied fields of endeavor for the trained man. To many people the terms "agriculture" and "farming" mean the same. It is true that farming—or the production of farm products—is the backbone of the agriculture industry, but I will present the opportunities in agriculture from a much broader aspect. The 1930 census showed that an average of $92.71 per person was spent for food—more than for any other single basic goods or service. Automobiles were second, $78.25, merchandise next with $74.23, clothing, $35.00 per person.

There are approximately 6,000,000 farms in the United States on which farm products are produced. The products must be assembled from the farms, financed, processed, graded, packaged, transported, stored and delivered. These steps have given life to a large number of services, which in many cases are being and will continue to be performed by persons with an agricultural background and training. Such agencies as grain elevators, creameries, packing plants, canneries, storage houses, and transportation companies are important in processing of farm products. There are also

a large number of agencies furnishing supplies to the farmers such as fertilizer, feed, farm implements and many other products whose officials are asking for men familiar with the problem of agriculture.

These many activities require trained men to operate, manage, supervise, teach, inspect, carry on research, conduct extension work and many other services. It is for these many fields or services that the agricultural colleges are training men and women.

Choosing a Life Work

Young people should consider three major factors when considering a branch of agriculture as the choice of a life work.

First, a person must know of the opportunities in agriculture and related occupations for the agriculturally trained youth.

Second, he must know the aptitudes necessary for a fair degree of success.

Third, he should measure his true interests by one or more of the interest tests available. There are many things a student should know about the vocations before he can be sure of his interests.

The perfect type of job or occupation will be the one in which the young man or woman has the maximum interest, ability and which offers the maximum opportunity. Many jobs or professions are similar in nature. The jobs within one occupational field are large in number and quite varied.

The student should determine his basic interests and aptitudes. The guidance departments of our high schools or occupational opportunities service of our colleges and universities are glad to give tests and to counsel with students regarding their future occupations. The agricultural college of your state will supply you with a list of occupations into which graduates are employed.

An agricultural training offers a field of service which should appeal to a variety of interests in young men and women. Entrance into fields of service from an agricultural college is not limited to rural youth. The young man with an urban or city background who is interested in business and likes to be outside may want to consider farming, such as animal husbandry, poultry husbandry, some phases of agricultural engineering or a career in forestry or conservation, farm management, dairy technology, or agronomy.

The person interested in teaching may want to consider teaching vocational agriculture in high school or may major in some phase of agriculture, continue with graduate work and eventually enter college teaching.

The first two years of work in most agricultural colleges has been organized to provide contact with the various phases of agriculture. Many colleges of agriculture prefer that a student undecided about his major use as much of the first two years as possible to find himself. The dean, junior dean, or assistant dean can assist him by suggesting courses, interpreting the results of interest tests, vocabulary tests, and in the light of his background and abilities, recommend an area in which he may major.

Farming

There are five general groups into which we may classify the graduates of agricultural colleges, namely: those engaged in farming, teaching or extension work, research, business or industry, and home economics.

Approximately one-third of the graduates of the College of Agriculture at Ohio State University are engaged in *farming*.

Many of the young men major in either animal husbandry, agronomy, agricultural engineering, poultry husbandry, rural economics, or horticulture, then return to their home farm to enter into a father-son partnership.

There is also a great demand for herdsmen, farm managers, farm superintendents and employees with agricultural training. Agricultural colleges were organized to meet the demands of people with a desire to keep abreast of the latest scientific methods. The colleges of agriculture are keeping abreast of the changing agriculture by offering a wide variety of courses based upon scientific study and practical in nature.

The importance of an agricultural college education in the life of a farmer may be expressed in the words of Dean Emeritus Alfred Vivian of Ohio State University, who defines farming as: (1) a manufacturing business, (2) an art or profession built on broad application of all the natural sciences, of economics and of sociology, and (3) a mode of life.

Many universities also offer two-year programs in agricultural engineering, agronomy, animal husbandry comprising dairy husbandry, horticulture comprising floriculture, pomology, vegetable gardening, poultry husbandry and general agriculture. Students who have completed the two-year or short courses may be found in a great variety of employment.

Teaching

Teaching or extension work attracts approximately one-third of the young men that graduate from the colleges of agriculture. The rapid growth in number of schools offering vocational agriculture has made it possible to use every graduate during the last ten years with a major in agricultural education. The demand for county agricultural agents, 4–H Club leaders, and extension specialists in agricultural extension provides an opportunity for advancement. All phases of extension work and teaching provide a pleasing combination of outdoor life, rural leadership and community influence.

Research

The area of research in agriculture is a promising field for the young man or woman with a scientific turn of mind. The development of hybrid corn, new varieties of wheat, soybeans, oats, cereals for human consumption and some work with vitamins is being carried on by colleges and experimental stations in cooperation with the federal government. A large share of the research in many private industries such as fertilizer companies, feed companies, farm implement companies, packing plants, and incubator companies is being done by agriculturally trained persons. Recent advances in experimental work of food technology and nutrition opens up a new field of science. The sanitation, economic and nutritional aspects of the food problem are of universal interest. Occupational opportunities for graduates with a major in plant or animal science are steadily increasing.

Business

Business and industry also call upon the agricultural colleges for young men. For example, milk is produced on a large number of farms scattered widely throughout the United States and goes to the consumer in the form of fluid milk, cream, cheese, butter, ice cream, condensed milk and milk powder. To assemble, process and distribute these products requires a large number of agencies. These agencies are operated by milk plant or creamery managers and

employ butter makers, ice cream makers, chemists, bacteriologists, salesmen and field representatives. The demand for trained men in these fields at the present time is far in excess of the supply. The same situation exists in poultry, agricultural engineering and other fields. There is a similar demand from industry for men who specialize in poultry, agricultural chemistry, agricultural engineering, rural electrification, farm power, fruit growing, vegetable gardening, floriculture, animal husbandry, agronomy, and farm management.

Some of these activities involve a great many types of work. Some of it is of such nature as to require very little agricultural training, but many who start in these jobs find that they may be advanced to other jobs in which a knowledge of the commodity, its characteristics, uses, geographical distribution, control measures used in handling or processing will help them do their work more successfully.

Home Economics

Faith Lanman Gorrell, Chairman of the School of Home Economics at Ohio State University, says: "Home economics offers a great variety of vocational opportunities for women. Home economics graduates are serving their home, their community, and their country in a wide variety of ways. Besides having a vital place in the home, they have opportunity to choose among many jobs and professions."

The greatest demand for home economists is in teaching in junior and senior high schools, and graduates are admitted to positions in such schools immediately after graduation. Other opportunities for home economists in teaching are in nursery schools, elementary schools, junior colleges and colleges, adult education programs and informal types of education for young people and adults. For such work, some additional preparation and experience is usually necessary.

There is a large and increasing demand for dieticians in hospitals and public institutions, and for food managers in dormitories, school lunch rooms, industrial plants and public eating places. Students wishing to prepare for such work should plan to spend a period of internship or assistantship after graduation.

Business is increasingly employing home economics graduates in commercial work dealing with food, equipment, textiles, clothing and interior decorating.

New opportunities are developing for experienced home economics graduates as advisers in home management, housing, nutrition, and child care in public and private welfare agencies. Trends indicate that the demand for such workers will increase greatly.

A small but increasing number of home economists are needed as research and technical workers in foods, nutrition, equipment and textiles. This type of work requires some specialization beyond the graduation.

AGENDA OF CHICAGO MEETING

April 24, 1943

9:30 A.M.	Call to order.
	Report of Secretary-Treasurer.
	Report of Managing Editor.
	Report of Membership Committee.
	Consideration of Amendments.
	Consideration of purposes B, C, and D.
12:30 P.M.	Luncheon at College Club.
2:00	Call to order.
	Consideration of unfinished business.
3:30	Editorial Board Meeting.
6:30	Dinner at College Club.
7:30	Executive Board Meeting.

Editorial Comment

THE FUTURE FOR VOCATIONAL BIOLOGY

Following Pearl Harbor, drastic changes in educational procedures, aims and techniques have been forced upon us. Others are likely to follow. These changes are temporary. Our efforts are now being exerted toward a speedy and successful termination of the conflict in which we are engaged. All teachers have endeavored to modify their courses in keeping with these trends. A better day is sure to come. An important contribution to a permanent peace to follow will be the happy adjustment of post-war youth in a vocation to which they are best suited. Biology teachers will surely have an important part in this adjustment. It is not only an opportunity but a challenge to our best efforts to properly guide those students who come to us for advice in the selection of their life's work. The study of biology will doubtless continue to occupy a prominent place in the curriculum. For, as in the past, we cannot visualize a world in which the life sciences fail to contribute immeasurably to the welfare of mankind. We cannot at present be sure just what these opportunities will be, but we can be sure that there will be such for enterprising youth, as there have been in the past. This enterprising spirit of youth will be a valuable asset during the period of educational and economic adjustment. It is one thing, we can be assured, that the war will not destroy. There is no doubt that the vocational aspect of education will occupy an even more prominent place than in the past. Every teacher of biology owes it to his students to be prepared to guide them more adequately in the selection of a vocation to which a study of biology is a prerequisite. To that aim this issue of the journal is dedicated.

With the foregoing in mind we have endeavored to obtain expressions of opinion from the best thinkers of the country concerning some vocational opportunities that now, or are likely to exist in the future, in which a study of biology is useful. This, we believe, has been accomplished, as an examination of the excellent articles in this issue will readily attest. It is our feeling that such expressions of opinion, dealing with a topic of such major importance, should come from those actually on the "firing line," and who can speak with authority. The response has been most gratifying. Each contributor has appeared more than willing to make a contribution, even though it meant the addition of another task to an already overcrowded schedule. For these contributions to the advancement of the teaching of biology in the secondary schools of the nation, we are duly grateful.

J. A. Trent,
State Teachers College,
Pittsburg, Kansas

AUDUBON JUNIOR CLUBS

To create genuine enthusiasm for bird study, and to help your class develop a lasting interest in the out of doors, form an Audubon Junior Club.

Audubon Junior Clubs have been sponsored by the National Audubon Society for 32 years. In wartime it seems more important than ever to teach children to observe, understand and enjoy the familiar birds seen on their own streets, in city parks, and nearby in the country. To watch a bird is to discover the many other animals, plants, too, upon which it depends for food and shelter. Thus, a knowledge of birds provides an introduction to the whole field of nature study.

Audubon Junior Clubs offer an inexpensive means of obtaining excellent teaching material. A special endowment for Junior Clubs covers over half the cost. Dues of ten

cents per child, in groups of ten or more children per school year (September to June), brings the following interesting supplies:

A. For every child
   1. A bird membership button
   2. 6 four-page bird leaflets, by Roger Tory Peterson.
      Junior edition with large type and simplified text for elementary grades.
      Senior edition with smaller type and longer text for secondary schools.
   3. 6 full-page color plates of birds described in the leaflets.
   4. 6 outline drawings for coloring (*supplied with Junior edition leaflets ONLY*).

B. For every club
   "News on the Wing"—club newspaper. Two issues each semester.
   "Things to Do"—a special leaflet packed with practical suggestions for club activities.

C. For clubs of 25 or more members
   Audubon Magazine—three issues each semester.

The National Audubon Society will gladly send materials at once to any teacher sending dues for 10 or more children. Write to Junior Clubs Department, National Audubon Society, 1006 Fifth Avenue, New York City.

LEST WE FORGET

The vital role of the home front in the present global struggle for the preservation of freedom is the theme of LEST WE FORGET—ETERNAL VIGILANCE IS THE PRICE OF LIBERTY, the seventh series of 13 dramatic transcriptions for radio broadcast and use in schools, issued by the Institute of Oral and Visual Education. The new series became available on March 1, 1943, to the 435 radio stations throughout the country. The inspiring stories are based upon contemporary history and stress the need for vigilance by every American as one of the major safeguards of our democratic freedoms which must become the democratic foundations of the post-war world.

Each of the 15-minute recordings is devoted to the need for vigilance in each of the different phases of the home front: *the community, the schools, the factory, business, the home, religion, the courts, the government* and *fraternal organizations.* Four of the recordings deal with problems of vigilance against *tyranny*, against *rumor*, for *new truths* and *among war veterans.*

A special "I Am an American" recording is included for broadcast on "I Am an American Day." A handbook on the series containing additional material for teachers has been prepared and is available upon request at the offices of the Institute of Oral and Visual Education, 101 Park Avenue, New York, New York.

To enrich the program and to bring its message into graphic form, the Institute is offering without charge to all listeners—and especially to school children—a "Portfolio of Freedom" which contains the flags of the United Nations in full colors, portraits of United Nations leaders and American war heroes, as well as reproductions of the Atlantic Charter, the Bill of Rights and other basic documents of American freedom,—all of them suitable for framing.

"LEST WE FORGET—ETERNAL VIGILANCE IS THE PRICE OF LIBERTY" was prepared under the direct supervision of Dr. Howard M. LeSourd, Dean of Boston University Graduate School and Chairman of the Advisory Council of the Institute of Oral and Visual Education.

"I Am an American Day," according to Presidential proclamation, will be the third Sunday in May.

SPECIAL ISSUES

This is the last one of the series of *special issues* instituted by the board at the annual meeting two years ago. These issues have met with general approval and will be continued. Plans are under way for another series, although no definite arrangements have been made. No doubt a new series would have been actually under way by this time, had not the last annual meeting been cancelled. This matter will come up for discussion at the spring meeting of the Representative Assembly. If you have suggestions for a special number or if you would like to serve on a committee for a special issue in a field that interests you, please get in touch with one of the members of the editorial staff. The special issues require much reader cooperation.

It was decided not to publish a special issue on *biology in the war*, but rather to print any suitable contributions as promptly as possible. A certain amount of delay is necessary for a special issue, due primarily to the fact that all the articles have to wait until there are enough for an entire issue or at least for most of the space in an entire issue. It would not be difficult to get enough material for a special issue on war biology, but to do so would mean that some contributions would have to wait two or three months.

OPA LAUNCHES WARTIME BULLETIN FOR NATION'S EDUCATORS

A special publication for teachers and school administrators entitled *OPA Bulletin for Schools and Colleges* was announced recently by Dr. Walter D. Cocking, Chief of the Educational Services Branch, Department of Information, Office of Price Administration.

"It is our purpose," asserted Dr. Cocking in the January 1943 issue, "to incorporate in this bulletin content material, bibliographies, references, news items and other materials which will aid schools and colleges in developing a necessary wartime educational program."

Recognizing the need for developing a two-way flow of information between the OPA's educational office and schools and colleges in the field, Dr. Cocking invited educators to send in reports of their wartime educational programs related to price and rent control, and rationing.

With reference to the current economic situation, the *Bulletin* presents a short account of changes in the cost of living, a graph comparing the cost of living in World Wars I and II, a report of savings to consumers and the government through price control measures, a cartoon on War Ration Book Two, and a picture-graph on organized car sharing. Feature articles and a general bibliography in the *Bulletin* include short selected lists of annotated references pertaining to OPA's program.

Through the cooperation of the U. S. Office of Education, copies of the January issue of OPA's *Bulletin* together with a covering letter from Commissioner of Education John W. Studebaker were sent to all state departments of education, city and county superintendents, heads of colleges and universities, and editors of national and state educational publications. Each OPA Regional Office was supplied with a limited supply of copies which are available free to teachers and administrators upon request.

An article on the various biological vocations in the Federal Civil Service, by C. C. Hathaway, Chief of the Information and Recruiting Division, had to be omitted because of lack of space. It will appear in the May issue.

ANNOTATED BIBLIOGRAPHY ON BIOLOGICAL VOCATIONS

Of the several hundred different vocations now recognized, the majority may be thought of directly or indirectly as biological. Therefore practically all books and articles on vocations will treat in part at least of biological vocations. Since it would be almost impossible to list all of them, we have selected a few which we consider the best.

Bennett, G. Vernon and Sachs, Georgia May. *Exploring the World of Work.* Society for Occupational Research, Los Angeles. 1937. xx + 596 pp. $2.75.

An analysis of 19 groups of vocations with requirements and advantages of each of the major subdivisions.

Lapp, John A., *et al. Careers.* (rev.) Institute for Research, Chicago. 1941. 132 pamphlets of about 5000 pp. 75¢ ea.

No. 3 *Biological work as a career.* Others include animal husbandry, dentistry, forestry, general agriculture, home economics, medicine, nursing, veterinary, etc. Some questions answered are What is included? What qualities are essential for success? In what subdivisions may one specialize? What are the possibilities of getting a position and what is the remuneration? What are the duties of and special requirements for various positions offered?

McCaul, Margaret E. *Guidance for College Students.* International Textbook Co., Scranton. 1939. xiii + 231 pp. $1.80.

Part 3, choice of a vocation, gives bases for choice with detailed outline for study of an occupation.

Rosengarten, Wm. *Choosing Your Life Work.* McGraw-Hill Book Co., New York. 1936. xxiii + 353 pp.

Personal analysis and analysis of 43 groups of occupations with related vocations under each group.

For specific references, see:

Price, Willodeen, and Ticen, Zelma E. *Index to Vocations.* (rev.) H. W. Wilson Co., New York. 1938. 122 pp. $1.00.

This is a subject index to 1950 "careers" with book and periodical references for each.

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William Jewell College,
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Biology Problems in Agricultural Experiment Stations

IRA J. CONDIT
University of California Citrus Experiment Station, Riverside, California

High school and college students sometimes feel that probelms are being attacked and solved so rapidly that soon there will be no new problems for them when they are ready to launch forth into the sea of life. That this is far from the truth was recognized long years ago by James Russell Lowell when he wrote:

> New occasions teach new duties,
> Time makes ancient good uncouth;
> They must upward still and onward
> Who would keep abreast of truth.

It is a fact that new and startling advances are being made in the solution of hitherto vexing problems. Under the stress of war, greater advances are being made in a very few years than were made during peace times in the same number of decades. Every advance means new horizons, new opportunities, new fields of action. Some recent advances will be indicated here as suggestions for possible fields of study by biology students.

In January, 1888, the Board of Supervisors of Los Angeles County withdrew their offered reward of $1,000 for a perfect control of cottony cushion scale as they believed that D. W. Coquillet "the Government appointee, has by his gas system mastered the problem which has so long been a puzzle to all fruit-growers." Tent fumigation of citrus trees has ever since been a standard procedure in California and in many other citrus districts but perfection has never been achieved. One "fly in the ointment" is that some of the insects themselves refused to die during the gas treatment and there have gradually developed strains both of black scale and of red scale which are resistant or even immune to ordinary concentration of the gas. This necessitates further extensive studies of the insects themselves, methods of fumigation, and other possible insecticides.

Again, most insect pests are attacked by the insecticide method. Great advances, however, are being made in the study of predators and parasites—that is, by the "Bug vs Bug" method. Far corners of the earth have been searched for beneficial insects which prey upon and decimate their destructive neighbors sufficiently to keep damage to crop plants down to the minimum. The practical results of this work are typified by the success attained in controlling the citrophilus mealybug and in wiping out this menace to citrus trees. As pointed out in a recent report of the California Experiment Station, biological investigations have resulted in discoveries which have a very important, practical bearing. These findings deal with the reproductive habits of certain parasites. One of the curious facts brought to light is that two types of hosts are necessary for propagating the species and establishing them in the field. The male insects develop on one type of host, and the females on another type. Furthermore, mated females deposit their eggs in the body fluids of the host scale and these eggs

produce only female progeny. Unmated females deposit their eggs in or upon parasitic larvae, and these eggs produce only male progeny. The male larva cannot develop on the scale insect but only as a parasite of another parasitic larva. What vistas or avenues for future research these facts unfold!

Another instance where "new ocasions teach new duties" is the emphasis now being placed on the relation of viruses to certain plant diseases. Once a virus gets into the sap of a plant and causes pathological disorders, it can be eliminated in some cases only by total destruction of affected plants. This is the case in peach mosaic which has three or even four distinct strains. In California some strains attack peaches without producing symptoms; others produce prominent ringspots on the fruit. In New York State the "X-disease" of peach trees is a serious threat to the industry. Its spread can be prevented by destroying choke cherries within 500 feet of peach trees. Another virus disease in California is known as psorosis or scaly bark of citrus trees. Recently this disease has been traced to a virus of at least two types, one designated as *psorosis A* and the other as *psorosis B*. On older leaves the *B type* causes formation of large ring spots, while *A* shows only occasional small rings or circular spots. The *A type* shows on the fruit only rarely but the *B type* produces large, discolored rings and grooves, often causing the fruit to become bumpy and misshapen. The discovery of the various symptoms will make it easier to recognize the disease and make it possible to avoid transmission by budding.

Practically all the agricultural experiment stations in the United States are devoting much time and energy to plant breeding in the effort to produce better varieties of fruits, vegetables, flowers, and field crops. Many notable results have already been achieved but space will permit mention of only two crops benefited by this line of endeavor. The California Station has been successful in breeding new varieties of wheat by the backcross method—that is, by crossing a commercial variety with one that is resistant to a given disease and then crossing the resulting hybrid back to the commercial variety. This is repeated for several generations. The method is so based on well-known scientific principles that the breeder can predict in advance what a new variety will look like and often how long it will take to reach the desired goal. He can also add resistance against other diseases and pests as time and funds permit. In 1939 seed of the stem-rust-resistant *White Federation 38* wheat was released. In Imperial Valley the loss from rust in susceptible varieties ranged from 60 to 100 per cent, while the loss in *White Federation 38* grown in adjacent fields was only 3 to 5 per cent.

The second example of a crop plant notably altered by breeding is the peach. Most peaches grown in the United States are native to north China where winters are cold. In mild climates such as that of southern California, these north China peaches develop normal growth in spring and early summer following a chilly or cold winter. The same peach trees, in seasons following a warm winter, remain either partially or completely dormant throughout the summer, and fail to produce satisfactory flowers or fruit. There are, however, some peaches which have shorter chilling requirements than do the varieties grown commercially. Examples of these are the varieties *Honey* and *Peen-to*, both native to south China. Crossing of the common peach with varieties such as *Honey*, has resulted in

seedling peaches which are entirely dependable after the warmest winters and produce fruit of good size, color, and quality. It seems reasonable to expect therefore that there can and will be developed at least one good market variety of peach for each ripening season in mild climates.

The annual or biennial reports of agricultural experiment stations in the United States are replete with examples of achievements already attained or of projects under way to solve biological problems directly affecting the lives and properties of citizens. The solution of some problems can be expected in a relatively short period. Many if not most of these problems can be clarified only by years of patient study or research. When we oldsters have finished our experiments, published our findings and laid aside our tools, there will still be plenty of new questions to answer and hundreds of new problems to be investigated by young biologists now in courses of training.

Vocational Opportunities in Modern Industrial Biology

HARRY J. FULLER
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Modern high-school teachers of biology commonly emphasize three aims of their teaching endeavors: first, to present to all students a basic pattern of biological facts and principles, knowledge of which contributes to a well-rounded and cultural education and thus to a more discriminating and understanding appreciation of the rights and duties of useful citizenship; second, to give to all students a scientific acquaintance with the structure and functions of their bodies, so that they may learn how properly to safeguard their health and use their bodies intelligently; and third, give to some students their first pre-professional training in applied biology. Most teachers, in their handling of biological science as a pre-professional tool, emphasize particularly the applications of biological fundamentals to medical science, agriculture, the conservation of natural biological resources, and home economics, and, either through ignorance or lack of interest, often fails to call to the attention of their students the many other vocations and professions open to trained biologists, particularly in industrial organizations.

A statistical survey of contemporary positions in industrial biology would doubtless indicate that the majority of such positions lie in the field of bacteriology and industrial microbiology. Many vital industries in our intricate civilization depend upon the metabolic activities of micro-organisms and upon an adequate supply of trained biologists to supervise and regulate the activities of these organisms. The brewing and distilling industries, the production of ethyl, methyl, butyl, and other alcohols, of acetone, of lactic, acetic, citric, oxalic, and other organic acids, of glycerine, of yeast preparations for the baking industry, of various vitamins for use in human nutrition, of enzymes for medicinal and industrial purposes, the manufacture of cheese and various other dairy products, the curing of tobacco, the preservation of

foods, and numerous other industries require a steady, yearly output of bacteriologists from our American colleges and universities. In the field of micro-biology, there are, of course, many other positions open to trained biologists—in medical bacteriology, in laboratory technology, in public health and sanitation work, in water bacteriology, in medical mycology, et cetera. These medical applications of biological science are being treated in another paper in this series and thus will not be considered further in this one.

The lumber industry, in its broadest sense, holds out a variety of interesting positions to young people with adequate biological training. With the passing of large areas of our nation's virgin forests and thus of the days of wasteful, short-sighted and frequently swinish exploitation of our timber resources, a new viewpoint has come to the fore in modern lumbering organizations—namely, a recognition of the necessity of deriving every possible bit of usefulness from wood, of the importance of continually developing new uses for wood scraps, sawdust, bark, and other products formerly regarded as useless, and of managing timber, not as an unlimited, God-given natural resource, but as a crop to be planted, nourished, protected, and harvested like any other crop. The rapid expansion of this newer viewpoint has created a demand for scientists with training in wood anatomy, forestry, plant ecology, plant chemistry, seed physiology, forest pathology, entomology, horticulture, and other scientific fields. Both in government laboratories, such as the famous U. S. Forest Products Laboratory at Madison, Wisconsin, and in laboratories maintained by private lumbering corporations, numerous and varied researches are being prosecuted at the present time—investigations on paper manufacture from wood pulp, new uses for wood, fire-proofing of wood, wood seasoning and treatment to increase the durability and resistance of wood to decay, the control of tree diseases, scientific methods of reforestation and of nursery operation, the control of the weight, strength, and grain of woods through careful regulation of irrigation and soil fertilizing, increasing the number of products derived from the distillation of sawdust and of woods, and numerous other important investigations.

Chemical companies which manufacture chemicals of biological importance employ trained biologists to test these products and to develop new ones. The preparation and standardization of insecticides, fungicides, bacterial cultures for soil inoculation, plant hormones (used in hastening the rooting of cuttings, in preventing premature fall of fruits, and for various other purposes), and fertilizers require workers trained in mycology, plant pathology, animal physiology, entomology, plant physiology, plant chemistry, soil physics and chemistry, and other biological fields. A number of private corporations, whose business concerns agricultural products, and various U. S. government laboratories constantly seek to develop new uses for plant products: witness the enormous increase in the list of uses of vegetable oils—soybean oil, corn oil, cottonseed oil, linseed oil, coconut oil, and others,—in the uses of cellulose and cellulose derivatives, in the use of plant materials in plastics manufacture. For students with suitable training and a sincere interest in imaginative research, there are many professional possibilities in such work.

The great food-canning industry needs not only food bacteriologists, nutrition experts, home economists, animal physiologists, and biochemists in its personnel

but also finds necessary the training and skill of plant breeders, fertilizer experts, plant pathologists, seed physiologists and technicians, and other types of biologists in its ranks. The large pharmaceutical companies likewise require biologists in their work; botanists, plant chemists, serologists, vitamin experts, and animal physiologists are vital to successful production of safe and standardized drugs and to the prosecution of research in pharmacological work. The major rubber companies number biologists among their employees; plant pathologists, horticulturists, soil experts, and plant physiologists work on their plantations, and biological chemists perform important laboratory functions.

In addition to the industries described above, there are several others which hire smaller numbers of employees with biological training. Biological supply houses employ collectors, histological technicians, aquarium experts, and animal keepers. Museums require trained taxonomists, taxidermists, lecturers and demonstrators, and other types of biologically-trained personnel. Commercial green-houses, nurseries, and seed farms number plant breeders, soil scientists, plant pathologists, floriculturists, and entomologists among their employees. Then there is a limited number of positions in biological-editorial work available to qualified persons; farm journals, trade journals in the flower-growing, fruit-producing, bee-keeping, and other agricultural industries include on their staffs scientific experts to aid in critical reading of manuscripts, in editorial writing, in convention reporting, and other types of trade-journalistic activities. In meat-producing and meat-packing industries, animal pathologists, animal geneticists, and animal physiologists constitute an important part of the scientific staffs.

High-school and college teachers of biology should include, in their work with students, vocational guidance to these various opportunities in industrial biology, as well as the counselling of students who plan careers in dentistry, medicine, nursing, home economics, and agriculture. Such vocational guidance can be made effective if teachers will undertake to emphasize the following points to students:

1. *The nature of the opportunities in industrial biology and the relative demands for biologists in various fields of industrial biology.* In order to inform himself upon these points, the biology teacher may obtain information from individual commercial organizations—pharmaceutical companies, canneries, cereal manufacturers, lumber companies, chemical companies, manufacturers of dairy products, flour mills, seed houses, and others, names and addresses of which can be obtained from magazine advertisements, libraries and other sources—from governmental agencies, such as the U. S. Forest Products Laboratory, U. S. Forestry Service, U. S. Department of Commerce, the U. S. Biological Survey, Bureau of Education of the U. S. Department of the Interior, U. S. Agricultural Experiment Stations, and others; from individuals who work successfully in various phases of industrial biology; and from trade and public-relations organizations of biological industries, such as the National Lumbermen's Association (Washington, D. C.), the National Wholesale Druggists Association (Washington, D. C.), the National Paint, Varnish, and Lacquer Association (Washington, D. C.), the Chemical Foundation (New York City), Corn Industries Research Foundation (Indianapolis, Ind.), and others.

2. *The importance of properly-chosen*

high-school and college curricula as a preparation for work in industrial biology. The teacher should emphasize the fact that, although students whose formal education ends with their high-school work may often secure positions as laboratory technicians and assistants in industrial biological work, those students who have college or university training in biological sciences are potentially more valuable in industrial biology and are in a better position to execute their duties and to advance professionally and financially. The high-school teacher should stress the importance of a broad, basic scientific education in high-school and college work in preference to premature specialization at the expense of broad, fundamental training. Thus, every high-school student, whose interests point toward a biological vocation, whether in agricultural, medical, or industrial biology, should include in his curriculum biology, chemistry, physics, and some mathematics. Similarly, college students who wish to enter a professional biological field, should get a broad background in zoology, animal physiology, botany, bacteriology, and chemistry in their college course, and, if time permits, include basic work in entomology, physics, and mathematics, if they are at all able to do so. After acquiring a fundamental scientific background, students can then profitably enter upon specialized work in their chosen fields—food bacteriology, animal nutrition, physiological chemistry, economic entomology, horticulture, dietetics, etc. It should be clear both to students and teachers that modern industrial biology is primarily physiological and chemical biology. Morphological and taxonomic biology, although they are important in basic biological training, as specialties offer little opportunity in industrial biology. Virtually the only vocational outlets for morphologists and taxonomists are teaching and museum work.

Probable Future Opportunities for Biology Teachers

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Students in teachers colleges who may have become interested in the content of biology and those teachers normally teaching other subjects but who are teaching biology during the war are interested in the opportunities that are likely to exist for biology teaching in the future. Just at present opportunities are very good for women biology teachers to take the place of the men teachers who have been drafted or who have resigned to go into some more lucrative war industry. But when the war is over and the war industries close and our soldier boys return from the front, will there still be room for women biology teachers.

A basis for an answer may be found in the history of biology teaching in the past. During the last twenty to twenty-five years, women in ever increasing numbers have become biology teachers.

The war has just accelerated this natural replacement of men teachers by women. Then, once women have invaded a new field, they never entirely give it up again.

Furthermore after the war there will probably be a great "boom" in the manufacture of consumer's goods in place of the manufacture of war goods and this will absorb war workers and returned soldiers. This prophecy is based on the accumulated deficit of goods to supply consumer's needs resulting during war time and the fact that manufacturers are not tying up much money in huge plants that will not be worth more than fifteen cents on the dollar when the war is won. This time it is the Federal government that is building the large war plants. Thus most women biology teachers will likely be able to retain their positions.

It is not likely that teachers' salaries will become so large as those paid war workers in the larger plants. However, teachers may expect to receive from $100 per month in the small schools to $250 in the larger high schools. This will be enough to live on.

For the teacher who is willing to prepare herself to do a good job of teaching, satisfactory positions in the better high schools and colleges will probably be available. To illustrate this possibility, let us see what positions are occupied by all of the students graduated with the master's degree with a major in biology from a certain teachers college within the last twenty years. There was a total of 112 such students. Forty-eight of these are teaching in high schools (*i.e.*, they were before many of the men teachers were drafted) and 39 in colleges. Of these 39 who went to teach in colleges with only the master's degree, 12 have gone on with their college work and now have the Ph.D. degree. They received this degree from seven different universities and colleges. Fifty-seven of these students were women and 18 of these have already married. However, only 6 of these married women have given up teaching. Five students are critic teachers in demonstration or training high schools and five are high school principals. The remaining nine are distributed among these vocations: County Superintendent of Schools, State Department of Conservation, State Department of Health, U. S. Department of Agriculture, Research Specialist in Science Education, Elementary School Teacher, Physician. This list certainly shows what students of ability can do in the teaching field. Of course opportunities for college teaching are now temporarily much reduced because of the war, and the colleges are demanding better-trained teachers than before. However, we shall always have colleges and they must be staffed with teachers.

There are other compensations to teaching besides the salary and these should loom large in the minds of all teachers. (1) The stimulation of being with young, growing boys and girls. If one may not drink from the fabled fountain of eternal youth, one may still keep his spirit young through association with hopeful, eager youngsters. (2) The opportunity of meeting and having intercourse with learned people and with scholars. Teachers themselves should be learned people. Thus association of teacher with teacher should be growth-promoting. Teachers are usually members of forum clubs and of civic organizations that bring learned men to the community. This not only provides opportunity for teachers to meet such people but to meet some of the best educated people in the communities where they teach. (3) The almost constant

contact with books, magazines, and journals. The wide-awake, alert teacher reads much. She must keep up. Her profession, the public, and her own feeling of what is proper demand it.

The feeling of doing something of major importance for students and community is an added compensation. The biology teacher is especially fortunate in that her subject touches human life and community life at so many points. She is not just teaching a subject; she is stimulating the child to a more healthful and more socially useful life, and through the child is helping to make the community a better place in which to live.

Books

WEYMOUTH, CLINTON G. *Science of Living Things.* Henry Holt & Company, New York. 534 pp. 1941. $1.38.

Mechanical Make-up: The book is a 9½ by 6½ inch sturdily bound text. It has a modern typographical two-column arrangement with artistically set up print. The paper is a smooth and of sturdy variety; the halftones utilized are modern and used effectively to introduce new units of study. The legends accompanying each halftone contribute much to their usefulness as teaching devices.

Literary Style: The title, "Science of Living Things," accurately expresses the feeling of the entire book. The parade of life from beginning to end is a fresh and lively presentation, given in such a way as to introduce scientific reasoning without making the student conscious of its presence.

The presentation of material in short concise statements makes the book readable to the student. The long descriptions of the first unit give way to much less windy descriptions in later units, yet they serve to interest the student in nature and her beauties. Brevity in presentation serves to clarify for the student the points under discussion. (Two illustrations should be left out—the description of Halicystis which attains a "length of ten cubic centimeters" and the statement that from "birth to death the heart continues to beat"—the idea suggested in the latter being that the heart did not beat previous to birth.)

The presentation of new words and terms for the student seems to be too rapid in many cases, yet the terms introduced are all necessary for the full understanding of biological principles. Possibly this excuses the presence of as many as fifteen italicized words on two pages. The explanation of some of the words is new and very interesting. "The heart may be said to consist of two pumps, side by side." "*Peristalsis*, a series of wavelike contractions have much the same effect as though a ring half the diameter of the esophagus were slipped over its upper end and then pulled downward." "*Pleura*, a smooth, tough, elastic membrane that covers the outside of each lung and lines the inside of the chest walls." The analysis of the terms introduced in terms of their original meanings help to correlate with other subjects.

On first looking at the text, one is impressed by the finality of the material presented. The author gets away from this feeling somewhat by including activities which require much interpretation. Here was a text that could be read for the material—not only for the authors stumbling words.

Psychological Soundness: The book is written as though the author were speaking directly to the pupil. The book is divided into units which are nothing more than new names for chapters and no real relationship between the units can be detected. It is psychologically sequential only in that it starts from a simple beginning and becomes more complex. It appears to be very well adapted to the age and grade of the average biology pupil. Individual differences are provided for in a choice of activities at the end of each "unit" but this will not help a student who is having difficulty in understanding some of the fundamental precepts of biology. These activities are an excellent addition to classes which do not have workbooks of some sort. No emphasis is put on the scientific method or its use. Most of the emphasis is put on pure subject matter.

Much of the work is presented in problem form but they (the problems) are too specific. Note: "Would you like to see tiny things invisible to the naked eye, from which plants and animals originate?" These questions do not stand out from the rest of the text.

In general, this is an information type book—giving interesting and abundant information in no closely related fashion. The author states that the book is "organized in twelve comprehensive units, each presenting a major biological principle," but I fail to see where such units as Unit III, "Getting Acquainted with the Plant Groups," or Unit IV, "Friends and Foes among the Insects," present any biological principle, let alone a major one.

Learning Exercises and Teacher Helps: One of the stated aims of this text is "to make provision for the active participation

of the pupil in the learning process." It is fitting, therefore, that the pupil activities include a large proportion of directions for field work, and for simple laboratory exercises, dissections, and demonstrations to be performed by the students. With these directions are numerous questions, and some of them are factual, others requiring the pupils to make their own observations and draw their own conclusions from their data. On the whole, however, these activities do not employ the problem approach.

Since there is an abundance of these activities of varying degrees of difficulty, the book allows provision for individual pupil differences. No summaries, nor directions for leading pupils to make their own, are included. The bibliographies for each unit give the pupils a wide range of interesting and useful books. There is a pronouncing glossary in addition to the definitions included in the text. Both the table of contents and the index are complete.

Subject Matter: The author covers the following topics in twelve units of work: Ecology, Cell Study, Plants, Invertebrates, Vertebrates, Plant Physiology, Insect Relationship, Animal Physiology, Behavior, Health, Conservation, Changes in Living Things. The last mentioned has a questionable degree of emphasis; most modern biology textbooks devote some time to heredity, inter-relationships of animals, and plant and animal breeding. There are two extremely distinctive and interesting highlights found in this text that very few biology books include. There is much space devoted to home flower and vegetable gardening. It is elementary but practical and directive. Also, there is a last unit on first aid. These practical biology correlations with the demands of our present world difficulties are indeed timely.

ALAN A. NATHANS, (Chairman) New York
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CHRISTENSEN, CLYDE M. *Common Edible Mushrooms.* The University of Minnesota Press, Minneapolis. 124 pp., 4 color plates, 2 diagrams, 62 photographs. 1943. $2.50.

A small, handy book for the amateur mushroom collector. It describes and pictures only the most common fungi, including less than sixty species. Some poisonous ones which the beginner must learn to avoid are included. Throughout the book the author stresses the idea of selecting mushrooms for eating on the basis of species recognition rather than on any general differences between poisonous and edible ones. The book is divided into five main parts. 1. About mushrooms: a general discussion of how and where mushrooms grow, differences between poisonous and edible ones, identification, and collecting. 2. The foolproof four: morels, puffballs, sulfur polypore, and shaggymane. 3. Mushrooms with gills: subdivided according to the color of the spore print. 4. Mushrooms without gills: this includes puffballs, morels, pore fungi, club fungi, tooth fungi, and jelly fungi. 5. Mushroom cookery: many recipes are given for general mushroom cooking as well as for certain species. The discussions of the species, headed by such terms as "poisonous," "edible and choice," or "edible but uninteresting," contains a description of the fungus, where it grows, and a few words about its edibility and flavor.

The book is written in language for the layman or the high school student. Scientific terms have been held to a minimum. It is small and durable enough to be taken into the field. The photographs are very good. A bibliography and index are included.

HOMER A. STEPHENS

Biological Briefs

NETTING, M. GRAHAM. *Prehuman Isolationists.* Fauna 4: 98–102. December, 1942.

The unusual fauna of the Australian region is partially familiar to the layman, but a study of zoogeography is necessary to understand the reasons for the abundance and variety of marsupials, poisonous snakes, and flightless and nectar-eating birds, together with the absence of most placental mammals, amphibians, and modern birds. Terrestrial vertebrates probably originated in the heart of an ancient Afro-Eurasian land mass; from here by way of land bridges successive waves of animal life spread westward to Europe and Africa, southward to Australia, and north-westward to the Americas. Because of the survival and the great diversity of its primitive forms, the Australian region must have been permanently separated from the Asian land mass before the evolution of the more efficient placentals and of other modern forms. Bats and birds have flown across since then, and rats and mice have "hitch-hiked"; otherwise, the ancient life forms branched out to fill the varied niches of the environment.

ADDAIR, JOHN, and L. H. SNYDER. *Evidence for an Autosomal Recessive Gene for Susceptibility to Paralytic Poliomyelitis.* Journal of Heredity 33: 307–309. September, 1942.

The authors present evidence that susceptibility to infective paralysis may be in-

herited. The study was made in McDowell County, West Virginia, of a population showing much intramarriage and many types of family interrelationships. The occurrence of poliomyelitis is abnormally high in the county, and affected persons are often closely related. Several cases of progressive muscular dystrophy also occur in the families studied.

JENNISON, H. A. *Keeping Garden Flowers Fresh.*.. Journal of the New York Botanical Garden 43: 252–254. October, 1942.

Charcoal, a few drops of formalin, or ½ oz. of potassium permanganate in the water for cut flowers will keep them fresh, and ½ tsp. of peppermint extract per quart of water often preserves flowers better than boiling or burning the stems. All foliage leaves and buds which would be covered by water should be removed. Cut stems slantwise. Split or crush woody stems the lowest three inches, soak in cool water overnight, and remove the bruised ends in the morning. To open buds quickly, place them in deep warm water in a humid atmosphere. Asters and chrysanthemums will last well if sugar is put in the water, while boric acid helps preserve carnations. The stems of dahlias, hollyhocks, delphiniums, and poppies should be sealed in scalding water.

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